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(Nos. I TO IV.—1900.)

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> "It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease." SIR WM. JONES.

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[See also King, separate slip.]

Malayan Peninsula, new species of Melastomaceæ.

JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

Vol. LXIX. Part II.—NATURAL SCIENCE.

No. I.—1900.

I.—*Materials for a Flora of the Malayan Peninsula.*—*By* SIR GEORGE KING, K.C.I.E., M.B., LL.D., F.R.S., &c., *late Superintendent of the Royal Botanic Garden, Calcutta.*

No. 11.

After about two years of unavoidable delay, I am now able to offer to the Society a further contribution towards the completion of these *Materials*. The paper now submitted gives an account of the natural order which, in the sequence hitherto followed, falls to be numbered XLVII. An account of the family *Myrtaceæ* which ought, according to that sequence, to have immediately preceded this one of *Melastomaceæ* is now in preparation, and will I hope before long be ready for presentation to the Society. The present paper is not entirely my own work, the account of the genus *Sonerila* having been most kindly prepared for me by Dr. O. Stapf, First Assistant in the Royal Herbarium, Kew, whose contributions to the Botany of Borneo, published by the Linnean Society of London, have already marked him as an authority on the Malayan Flora.

Order XLVII. MELASTOMACEÆ.

Herbs or shrubs, more rarely trees or climbers. *Leaves* opposite or rarely whorled, generally petioled, entire or nearly so, often palmately 3–5–7-nerved from near the base to the apex (mostly pinnate-veined in *Memecylon*); stipules 0. *Flowers* spiked, panicled or cymose, rarely solitary or fascicled, regular, hermaphrodite. *Calyx-tube* united by vertical walls to the ovary, rarely nearly free; limb usually 4–5- (sometimes 3- or 6-)lobed, or truncate, rarely falling off in a cap. *Petals* as many as the calyx-lobes, contorted in bud, inserted on the margin of the calyx-limb. *Stamens* as many as or more than (frequently twice as many as) the petals, inserted with them; alternate stamens often shorter, sometimes rudimentary, filaments bent inwards in the bud; anthers opening at the summit by one or two pores, rarely by slits down the face; connective often appendaged near the base by bristles, tubercles or a spur. *Ovary* 4–5- (rarely 3- or 6-)celled (in *Memecylon* 1-celled); style simple, filiform, rarely short; ovules very many (except in *Memecylon*); placentas axile, parietal or free central. *Fruit* included in the calyx-tube, capsular or berried, breaking up irregularly or by slits through the top of its cells. *Seeds* minute, very many (in *Memecylon* one only); albumen 0; cotyledons short (or in some of the *Memecyleæ* long, thin and convolute).—DISTRIB. Species about 2700, tropical, with a few subtropical; mostly in America, but many in south-east Asia, and a few in Africa and Polynesia.

SUBORDER I. MELASTOMEÆ. *Ovary* 3–6-celled. *Ovules* very many, on placentas radiating from the axis. *Seeds* very many. *Anthers* opening by a single terminal pore (rarely by 2).

Tribe I. OSBECKIEÆ. *Seeds* curved through half a circle, minutely punctate.

Stamens all nearly alike. Fruit a berry ... ... 1. OTANTHERA.
Stamens very unequal ... ... 2. MELASTOMA.

Tribe II. OXYSPOREÆ. *Seeds* straight, oblong or cuneate, raphe often excurrent. *Ovary* with the vertex usually free, conical. *Petals* more than 3. *Inflorescence* not scorpioid. *Fruit* capsular.

* *Inflorescence terminal (see also* Ochthocharis).

Panicles broad, often coloured ... ... 3. OXYSPORA.
Panicles narrow. Flowers minute ... ... 4. ALLOMORPHIA.

** *Inflorescence axillary, stamens equal, flowers minute.*

Stamens 4 ... ... 5. BLASTUS.
Stamens 10 ... ... 6. OCHTHOCHARIS.
Stamens 8 ... ... 7. ANERINCLEISTUS.

Tribe III. SONERILEÆ. *Seeds* straight, oblong or cuneate, often angular, raphe sometimes excurrent. *Ovary* flattened or depressed at the vertex. *Fruit* capsular.

Petals 3. Inflorescence scorpioid ... ... 8. SONERILA.
Petals 4. Flowers in a long-peduncled head ... 9. PHYLLAGATHIS.

Tribe IV. MEDINILLEÆ. *Seeds* straight, cuneate or obovate, often angular. *Connective* often appendaged near the base. *Fruit* baccate.

* *Longer stamens having two long bristles attached to the base of the connective in front.*

Cymes lateral ... ... 10. MARUMIA.
Panicles terminal ... ... 11. DISSOCHÆTA.

** *Longer stamens having the connective at base variously appendaged but not with two long bristles in front (equal and with two short bristles in one species.)*

Four vertical plates on the ovary ... ... 12. ANPLECTRUM.

*** *Stamens equal or nearly so.*

Connective not at all or very shortly produced at the base, but having 2 tubercles in front and a spur behind ... 13. MEDINILLA.

Anthers not produced at the base; connective with tufted beard at the base behind but not spurred ... ... 14. POGONANTHERA.

Connective not produced at the base and with no appendages in front, but minutely spurred behind, not bearded ... ... 15. PACHYCENTRIA.

SUBORDER II. ASTRONIEÆ. *Ovary* 4–5-celled; ovules very many on parietal nearly basal placentas. *Seeds* very many. *Anthers* short, opening by slits. *Fruit* baccate.

Calyx-tube smooth. Panicles terminal ... ... 16. ASTRONIA.

Calyx-tube verrucose. Cymes small ... ... 17. PTERNANDRA.

SUBORDER III. MEMECYLEÆ. *Ovary* 1-celled; ovules about 9 on a basal short free-central placenta. *Stamens* equal; anthers short, opening by pores or short slits. *Berry* 1-seeded.—*Leaves* usually pinnate-nerved.

Stamens 8 ... ... 18. MEMECYLON.

1. OTANTHERA, Blume.

Slender shrubs. *Leaves* membranous, entire, 3–5-nerved. *Panicles* terminal or sub-terminal, lax, cymose, few-flowered. *Calyx* bearing on its ovoid tube simple or tufted bristles, rarely glabrous, the lobes 5 or 6, equal to or shorter than the tube, deciduous. *Petals* 5–6, obovate, the apex rounded or acute. *Stamens* subequal, 10–12; anthers opening by a terminal pore, not beaked, the connective not produced at the base, or slightly biauriculate in front. *Ovary* half-inferior, with 5 or 6 bristles at its apex, 5–6-celled; style filiform, simple; ovules numerous on axile placentas. *Fruit* 5–6-celled, baccate. *Seeds* small, curved, punctate. DISTRIB. Species 7 or 8; Malaya, Burma, Philippines, N. Australia.

Calyx-tube bearing simple bristles ... ... 1. *O. celebica.*

Calyx-tube quite glabrous ... ... 2. *O. nicobarensis.*

1. OTANTHERA CELEBICA, Blume, Mus. Bot. Lugd. Bat. I, 56. *Leaves* narrowly elliptic, shortly acuminate: upper surface sparsely strigose, the nerves glabrous, lower usually glabrous, the main nerves (and sometimes the minor also) with sub-adpressed bristles: length 2·25–3·5 in., breadth ·5–1·5 in., petioles ·2–·4 in. long. *Calyx-tube* with simple acuminate bristles often bulbous at the base, the teeth setose. Naud., Ann. Sc. Nat. Ser. 3, XIII, 353; Cogn. in DC. Mon. Phan. VII, 342.

Andaman Islands; common, *King's Collectors.* Distrib. Celebes.

2. Otanthera nicobarensis, Teysm. et Binn. Pl. Nov. Hort. Bogor. 29. *Leaves* lanceolate or oblong-ovate, acuminate, upper surface sparsely strigose, the nerves glabrous; lower glabrous except the strigose nerves; length 3 to 4·5 in., breadth 1·25 to 2 in., petioles ·5 to 1 in. *Calyx-tube* quite glabrous; the teeth sub-ciliate. C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 522; Kurz, Journ. As. Soc. Bengal, 1876, pt. II, 131; Cogn. in DC. Mon. Phan. VII, 342.

Nicobar Islands; *Novara Expedition.*

This has been collected only by the botanists of the Austrian expedition. It is the only species of the genus with a glabrous calyx.

2. Melastoma, Linn.

Scaly, strigose or villous shrubs. *Leaves* petioled, oblong or lanceolate, entire, 3–7-nerved. *Flowers* terminal, solitary, clustered or panicled, rose or purple, 5- (rarely 6–7-) merous. *Calyx-tube* ovoid or campanulate, with simple (rarely with penicillate) hairs, lobes deciduous. *Petals* equal in number to the calyx-lobes. *Stamens* twice as many as the petals, very unequal, alternate longer ones with purple anthers having the connective long-produced at the base and terminating in two lobes, the shorter ones having yellow anthers, the connective not produced but with two tubercles in front. *Ovary* ovoid, more or less united to the calyx-tube, 5- (rarely 6–7-) celled, apex bearing bristles; style filiform, simple; ovules very numerous, placentas axile. *Fruit* berried, succulent or coriaceous, enveloped in the calyx-tube, bursting irregularly. *Seeds* minute, very many, curved through half a circle, minutely punctate.—Distrib. Species 40; Asia, North Australia and Polynesia.

Calyx-tube densely covered with long, flexuose, spreading, shining, coloured bristly hairs ·25 to ·5 in. long; young branches, petioles, and pedicels with stiff spreading bristles; flowers 2 to 3 in. in diam. ...	1. *M. decemfidum.*
Calyx-tube, young branches, petioles and pedicels with adpressed, lanceolate acuminate, serrulate scales: cymes condensed, flowers 1·25 in. across	2. *M. imbricatum.*
Calyx-tube densely clothed with linear acuminate, entire or serrate scales, those of the young branches, petioles and pedicels shorter and broader; corymbs with deciduous (often large) bracts; flowers 2 to 3 in. across (only 1·25 in var. *perakensis*)	3. *M. malabathricum.*

1. Melastoma decemfidum, Roxb. Hort. Beng. 90; Fl. Ind. II, 406. A shrub, 5 to 10 feet high; young branches at the nodes and near the tips, petioles and pedicels with numerous stiff, spreading bristles. *Leaves* narrowly-lanceolate or oblong-lanceolate, acuminate, 3- to 5-nerved; the upper surface smooth except for a few scattered

adpressed hairs, the lower glabrous, glandular-punctate; length 2·5 to 5 in., breadth ·6 to 1·8 in.; petiole ·25 to ·5 in. long. *Flowers* solitary or two or three together, bright purple, 2 to 3 in. in diam., the bracts few, short, acuminate; pedicels under ·5 in. *Calyx-tube* densely covered with long, flexuose, shining, coloured, bristly hairs; ·25 to ·5 in. long, the teeth rather shorter than the tube, ovate-lanceolate, acuminate, glabrous inside, deciduous. *Fruit* ·75 in. in diam., truncate at the apex, ovoid to ovoid-globular, ·5 in. in diam. Jack in Trans. Linn. Soc. XIV, (1822) 6; DC. Prodr. III, 146; Naud., Ann. Sc. Nat. Ser. 3, XIII, 282; Bl. Mus. Bot. I, 55; Cogn. in DC. Mon. Phan. VII, 345. *M. sanguineum*, Sims in Bot. Mag. t. 2241; DC. Prodr. III, 145; Don in Mem. Wern. Soc. IV, 289; Miq. Fl. Ind. Bat. I, pt. I, 504; Naud. l.c. 281; Triana in Trans. Linn. Soc. 60; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 524; Hemsl. in Jour. Linn. Soc. XXIII, 300. *M. malabathrica*, Sims in Bot. Mag. (not of Linn.) 529. *M. Gaudichaudianum*, Naud. l.c. 278. *M. macrocarpum*, Naud. l.c. 281 (not of Don). *M. porphyreum*, Bipp. et Bl. in Flora 1831, II, 487. *M. pedicellatum*, Naud. l.c. 280; Cogn. in DC. Mon. Phan. VII, 346.

PENANG; *Wallich* 4042! *King*, *Curtis* 683. MALACCA; *Griffith* (K.D.) 2245/1! *Maingay* 773, 774! *Ridley* 3228. PAHANG; *Ridley* 2667. KEDAH; *Ridley* 5211. PERAK; *Scortechini* 2123! *King's Collector* 1540, 1853, 8754. DISTRIB. Burma, China, Hongkong, Tonkin.

VAR. *mollis*, Clarke in Hook. fil. Fl. Br. Ind. II, 524. Young branches very hispid throughout their whole length; leaves with numerous sub-adpressed and spreading stiff hairs on both surfaces, especially on the nerves. Vidal Syn. Pl. Filip. t. 51; fig. D. *M. molle*, Wall. Cat. 4046; Triana in Linn. Trans. XXVIII, 60; Cogn. in DC. Mon. Phan. VII, 346. *M. crinitum*, Naud. l.c. 524. *M. malabathricum* Blanco, Fl. Filip. Ed. III, tab. 152 (not of Linn.).

SINGAPORE; *Wallich.* DISTRIB. Luzon; *Cuming* 853.

2. MELASTOMA IMBRICATUM, Wall. Cat. 4047. A spreading shrub, 5 to 15 feet high; young branches (especially at the nodes and tips), petioles, pedicels and calyx covered with adpressed, lanceolate acuminate, serrulate scales. *Leaves* elliptic-oblong to ovate-oblong, rather abruptly narrowed at the base, the apex acute or acuminate; main nerves 5 (the two lateral slender); both surfaces strigose, the main nerves on the lower with adpressed scales; length 3·5 to 8·5 in., breadth 1·5 to 4·5 in., petiole ·35 to 1·35 in. *Cymes* solitary, terminal, condensed, 1·5 to 2 in. in diam., enclosed in bud by deciduous, lanceolate bracts and bracteoles. *Flowers* 7 to 15, 1·25 in. in diam.; the pedicels ·15 in. long. *Calyx-tube* urceolate, the teeth shorter than the tube, lanceolate-acuminate, deciduous. *Petals* oblong. *Anthers* short. *Fruit* ovoid-globose or sub-globose, truncate and shortly toothed at the mouth,

pulpy, ·8 in. in diam. when ripe. Triana in Trans. Linn. Soc. XXVIII, 60; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 524; Cogn. in DC. Mon. Phan. VII, 355. *M. obovatum* var. *oblongum*, Bl. ex Triana l.c. 60.

PERAK; *Scortechini* 162! *King's Collector* 444, 6023, 8696, 10946! *Wray* 2980. PENANG; *Wallich*, *Curtis*. DISTRIB. Sumatra, *Forbes* 2072! Brit. India (Khasia and Assam); Tonquin.

Easily recognised by its condensed cymes and rather small flowers.

3. MELASTOMA MALABATHRICUM, Linn. Sp. Pl. 559. A spreading shrub, 3 to 6 feet high; young branches, petioles and pedicels densely clothed with rather short, acute to acuminate, often serrulate scales. *Leaves* ovate-lanceolate, ovate-oblong or elliptic, the apex acute or shortly acuminate, petioles short, 3- to 5-nerved (the marginal pair when present slender); both surfaces strigose, the hairs sparser on the upper and pale; on the lower the hairs more numerous (especially on the minor nerves) and darker, the main nerves clothed with broad-based acuminate scales: length 2 to 5·5 in., breadth ·75 to 2·5 in.; petioles ·2 to ·5 in. long. *Corymbs* terminal, few-flowered, enveloped in bud by large, deciduous, ovate-cordate bracts; *flowers* 2 to 3 in. across, the pedicels ·2 to ·4 in. long. *Calyx*; the tube cylindric-campanulate, densely clothed externally with linear acuminate, entire or serrate, pale scales, almost glabrous within; the teeth shorter than the tube (rarely equal to it), acute or abruptly acuminate, the apex deciduous, scaly only near the midribs. *Flowers* 2 to 3 in. across. *Petals* purple. *Fruit* subglobular, truncate, pulpy, ·25 in. in diam. when dry. DC. Prodr. III, 145; Roxb. Hort. Beng. 33; Fl. Ind. II, 405; Wall. Cat. 4040; Bl. Bijdr. 1076; Bot. Reg. t. 672; W. and A. Prodr. 324; Wight Ill. t. 95; Dalz. and Gibs., Bomb. Fl. 92; Naud. in Ann. Sc. Nat. Ser. 3, XIII, 285; Thwaites Enum. 106 (α and β); Benth. Fl. Aust. III, 293; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 523; Kurz, For. Fl. I, 503, not of Miq. Fl. Ind. Bat. I, pt. I, 507; Naud. in Ann. Sc. Nat. Ser. 3, XIII, 273; Cogn. in DC. Mon. Phan. VII, 349. *M. affine*, D. Don in Mem. Wern. Soc. IV, 288; DC. Prodr. III, 145. *M. obvolutum*, Jack in Trans. Linn. Soc. XIV, 3; Cogn. in DC. Mon. Phan. VII, 348. *M. articulatum*, *M. heterostegium*, *M. novæ-hollandiæ* and *M. sechellarum*, Naud. in Ann. Sc. Nat. Ser. 3, XIII, 285, 286 and 290. *M. velutinum*, Seem. Fl. Vit. 90. *M. Banksii*, Cunn. ex Triana. *Trembleya rhinanthera*, Griff. Not. IV, 677.

In all the provinces. DISTRIB. British India and Malayan Archipelago, W. China, Seychelle Islands, N. Caledonia, N. Australia.

A widely distributed species varying in reality very little in localities widely separated. The differences have however been taken as the bases of many bad and doubtful species. In his *Flora Australiensis*, Mr. Bentham remarks (and apparently with justice) that the whole twenty-four species described by Naudin in Ann. Sc.

Nat. Ser. 3, XIII, pp. 283 to 293; should be reduced here. It is not without reluctance that I give four varieties as follows:—

VAR. 1. *polyantha*, Benth. Fl. Aust. III, 292. Bracts of inflorescence small and very early deciduous or altogether absent; teeth of calyx usually short; leaves not exceeding 2·5 in. in length. *M. polyanthum*, Blume in Flora for 1831, 480; Mus. Bot. I, 52, t. 6; Naudin in Ann. Sc. Nat. Ser. 3, XIII, 287; Miq. Fl. Ind. Bat. I, pt. I, 502; Triana in Linn. Trans. XXVII, 59; C. B. Clarke in Hook. fil. Fl. Br. Ind. III, 523. *M. brachyodon*, Naud. l.c. 292; Miq. Fl. Ind. Bat. I, 570, t. 8, fig. A. *M. malabathricum*, Desr. in Lam. Encyc. Bot. IV, 36; Ill. Gen. tab. 361, f. 1; Jack in Linn. Trans. XIV, 4, fig. 1, *a* to *g*; Poir. Dict. IV, 37; Bl. Bijdr. 1070. *M. erecta*, Jack l.c. 5; DC. Prodr. III, 145. *M. tidorense*, Bl. in Flora 1831, p. 482, Miq. l.c. 514. *M. Royenii*, Bl. l.c. 483. *M. tondanense*, Bl. Mus. Bot. I, 54. *M. Hombronianum*, *M. oliganthum* and *M. microphyllum*, Naud. l.c. 278, 292 and 293.

ANDAMANS; *King's Collector.* SINGAPORE; *Anderson, King.* MALACCA; *King.* PENANG; *Curtis, King.* DISTRIB. Burma, N. China, Sumatra, Java and other islands in the Malay Archipelago, Luzon, N. Australia.

VAR. 2. *adpressa*, C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 523. Leaves narrowly oblong-lanceolate, smaller than in the typical plant and with harsher pubescence. *M. adpressum*, Benth. in Wall. Cat. 4081, Naud. l.c. XIII, 27; Cogn. in DC. Mon. Phan. VII, 349. *M. anophanthum*, Naud. l.c. 277.

MALACCA; *Maingay* 771 to 773 in Herb., Kew. PENANG; *Wallich, King, Curtis.* PROVINCE WELLESLEY; *Curtis.*

This is scarcely worthy of separation as a variety. It is slightly smaller and more strigose than the type and differs from VAR. *polyanthum*, so far as I can see, only by the large size of the bracts of the inflorescence.

VAR. 3. *normalis*, King. Hairs of both surfaces very numerous, those of the upper sub-adpressed, of the lower sub-spreading, softer (almost silky); calyx-teeth long, adpressed hairy within. *M. normale*, Don Prodr. Fl. Nep. 220; DC. Prodr. III, 145; Naud. in Ann. Sc. Nat. Ser. 3, XIII, 289; Kurz, For. Flora I, 504; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 524; Triana in DC. Mon. Phan. VIII, 352. *M. Wallichii*, DC. l.c. 146. *M. napalense*, Lodd. Bot. Cab. t. 707. *M. pelagicum*, Naud. l.c. 279. *M. longifolium*, Naud. l.c. 293.

In most of the provinces.

VAR. 4. *perakensis*, King. Leaves more or less broadly elliptic, 5- to 7-nerved, the upper surfaces strigose (sometimes nearly glabrous in old specimens), the lower softly and rather densely pubescent; branches, petioles and pedicels with long, spreading, rather soft hairs; calyx-tube densely clothed with long, flexuose, soft, often ciliate setae, the lobes large, adpressed strigose on both surfaces: flowers occasionally only 1·25 in. in diam.

PERAK; *Ridley* 2935! *Curtis* 1298! *Wray* 1733, 1883! *King's Collector* 2173, 2091, 8463! *Scortechini* 780. SINGAPORE; *Hullet* 5728. SELANGORE; *Ridley* 1996. DISTRIB. Java; *Forbes* 1142*a*.

This has broader leaves more softly hairy than VAR. *normalis*. The bristles of the calyx are much longer than in any other form of *M. malabathricum* and approach in number, length and density those of *M. sanguineum*, Don. A form of this from Perak, with the calyx-hairs shorter than the type, connects it with *M. imbricatum*, Wall.

3. OXYSPORA, DC.

Large spreading shrubs with drooping branches terminated by large, lax, almost naked panicles of rose-purple flowers. *Leaves* opposite, long-petioled, large, 5- to 7-nerved, ovate, acuminate. *Panicle* long, lax, sometimes narrow, the branches decussate, the flowers on the branchlets not glomerulate, bracts very small. *Calyx-tube* ovate, cylindric or funnel-shaped, its teeth 4, short, triangular. *Stamens* 8, four large with elongated anthers and four small, or all equal, opening by a single apical pore; the base produced and bilobed, the connective with or without an appendage. *Ovary* inferior, 4-celled, its apex glabrous; style simple, elongate; ovules numerous; the placentas axile, radiating. *Capsule* dry, elongate, double fusiform, with 8 ribs. *Seeds* numerous, falcate; the raphe lateral, produced at the apex into a point in front. DISTRIB. Seven species, Indian and Malayan.

Anthers dissimilar; petioles not winged ... ... 1. *O. stellulata*.
Anthers similar:—
  Petioles not winged ... ... 2. *O. acutangula*.
  ,, winged ... ... 3. *O. Curtisii*.

NOTE.

The genera *Allomorphia* and *Oxyspora* were so difficult of separation even before the discovery of the new species herein described (*viz.*, *A. alata*, Scort., *O. acutangula* and *O. Curtisii*) that Baillon (*Hist. des Plantes* VII, 48) united them. In Baillon's time *Oxyspora* was distinguished mainly by having four of its eight stamens much larger than and differently coloured from the other four. The three older species (all British Indian) *O. paniculata*, *O. vagans*, and *O. cernua* and the new Malayan one *O. stellulata* have this character, which would form an excellent head-mark for the genus if it did not break down. The character, however, does break down, for in the two Malayan plants here published as *O. acutangula* and *O. Curtisii* the eight anthers are all equal, although in all other respects these plants have the facies of the older species of *Oxyspora*. I have referred these to *Oxyspora* as preferable to the alternative course of putting them into *Allomorphia*, and I have therefore, in order to admit them, modified the generic character of *Oxyspora* as regards anthers. *Oxyspora*, as here defined, thus depends for its separation as a genus on its open paniculate inflorescence and long double fusiform boldly-ridged capsules, while *Allomorphia* is characterised by shortly-branched panicles, on the ultimate branchlets of which the flowers are clustered in pseudo-glomeruli, while the capsules are not much longer than broad and are often urn-shaped.

1. **Oxyspora stellulata**, King, n. sp. A shrub, 15 to 20 feet high; young branches, petioles, inflorescence and calyx-tube covered with pale, minute, stellate-hairy scales. *Leaves* somewhat unequal, ovate, slightly cordate at the rounded base, the apex shortly apiculate, 7-nerved (the middle nerve very strong); both surfaces free from hairs, but (especially the upper) with numerous minute hairy scales most numerous on the nerves, the transverse veins on the lower very distinct and straight; length 5 to 9 in.; breadth 2·25 to 4·5 in.; petiole 1·25 to 4 in. *Panicle* solitary, terminal, longer than the leaves; the branches in pairs, divaricate; flowers in umbels of 4 to 6 on the ultimate branchlets. *Calyx-tube* funnel-shaped, sub-tetragonous, the mouth with four small triangular teeth, narrowed at the base into the short pedicel. *Petals* 4, orbicular-ovate, blunt, glabrous. *Stamens* 8, very unequal, four linear, purple and twice as long as the other 4 short, yellow. *Disc* of 4 incurved plates. *Ovary* 4-winged. *Capsule* clavate, opening by 4 broad truncate valves; seeds minute, shortly beaked.

Perak; *Scortechini* 249 *in part! King's Collector* 418, 2851! *Wray* 1224. Distrib. Sumatra, *Forbes* 3034.

2. **Oxyspora acutangula**, King, n. sp. A bush; young branches boldly 4-angled, glabrous. *Leaves* elliptic-oblong, somewhat narrowed to the rounded base, the apex acute, 5-nerved; upper surface glabrous, the lower minutely lepidote-pubescent on the nerves and veins; length 4 to 6 in., breadth 1·75 to 2·5 in., petiole ·6 to ·75 in., minutely lepidote. *Panicle* solitary, terminal, usually somewhat shorter than the leaves, broadly pyramidal, lepidote-puberulous, many-flowered. *Flowers* (including the stamens) ·5 in. long. *Calyx-tube* funnel-shaped, minutely rufous-stellate lepidote, the mouth with 4 small triangular teeth. *Petals* 4, glabrous, broadly ovate, blunt. *Stamens* 7 or 8, equal, lanceolate, acuminate, slightly curved, the lobes at the base short, rounded, appendages none, but a grooved, narrow process on the back of the connective in the lower half. *Capsule* ovoid, narrowed to the equally long pedicel, 8-ridged, glabrous, the mouth with an everted rim, ·25 in. long.

Perak; *Wray* 329.

3. **Oxyspora Curtisii**, King. A shrub; branchlets bluntly 4-angled not winged, puberulous. *Leaves* ovate-acuminate, the base rounded, not passing into the petiole, 7-nerved, upper surface sparsely strigose, minutely lepidote, the lower glabrous, the edges glandular-serrulate; length 5 to 7 in., breadth 3 to 4 in., petioles 1·5 to 2·5, broadly winged, the wing much expanded at the base and joining that of the opposite leaf. *Panicle* solitary, terminal, spreading, longer than the leaves, with

numerous 4-angled branches, bracteate, everywhere minutely lepidote; the larger branches bearing a pair of very unequal bracts near the base exactly like the stem-leaves but smaller. *Flowers* on slender pedicels as long as the calyx-tube. *Calyx-tube* cylindric, 8-ribbed, tapering to base and apex; the mouth expanded and truncate but with 4 minute teeth. *Petals* 4, as long as the scaberulous filaments. *Stamens* 8, much exserted; the anthers longer than the filaments and longer than the calyx-tube, linear, acuminate, very slightly lobed at the base and inappendiculate. *Capsules* fusiform, ·2 in. long, much expanded at the mouth.

PERAK; *Curtis* 1300.

The only specimen of this which I have seen is in Mr. Curtis's Herbarium.

The species resembles *Allomorphia alata*, Scort. in its eight equal stamens, in the shape of its leaves and in its winged petioles; but differs in its more elongated capsules (which are fusiform instead of globose), in its larger laxer panicles and in its conspicuously bristle-serrate leaves. The two species just described form very marked connecting links between the genera *Allomorphia* and *Oxyspora*.

4. ALLOMORPHIA, Blume.

Shrubs, tall or short. *Leaves* opposite, long-petioled, large, lanceolate, ovate or orbicular, nerved, glabrous or nearly so. *Panicles* terminal, compound, with small flowers in clustered whorls. *Calyx-tube* funnel-shaped or campanulate, limb of 3 or 4 very short lobes. *Petals* 3 or 4, rose or white, small. *Stamens* 6 or 8, nearly equal; anthers attenuated at the top with one pore, cells long-produced and diverging at their bases; connective without appendage. *Ovary* 3- (rarely 4-) celled, enclosed by but nearly free from the calyx-tube; style filiform, simple; ovules very many, placentas axile, 2-fid. *Capsule* small, dry, not much longer than broad, usually urn-shaped, ribbed, opening at the top by 3–4 valves. *Seeds* very many, narrowly obtrapezoidal. DISTRIB. Species 5: whereof 4 are from the Malay Peninsula and its attached islands; 1 from Canton.

Petioles not winged:—
  Calyx-tube with 3 or 4 teeth; stamens unequal; anthers sagittate at base; capsule ribbed ... ... 1. *A. exigua.*
  Calyx-tube without teeth; stamens equal; anthers only slightly lobed at the base; capsules not ribbed ... ... 2. *A. Wrayi.*
Petioles winged:—
  Branches of the panicle winged; capsule sub-globular ... 3. *A. alata.*

1. ALLOMORPHIA EXIGUA, Blume in Flora 1831, II, 523. A shrub, 2 to 10 feet high; branches slender, subangular, puberulous or glabrous. *Leaves* elliptic-ovate to ovate-lanceolate, acuminate, those of the same pair often unequal in size; the base rounded or narrowed, not cordate;

upper surface very sparsely strigose (glabrous in old leaves); the lower glabrous, pale, the transverse nerves prominent; length 4·5 to 11 in.; breadth 1·5 to 5 in.; petiole ·75 to 4 in. *Panicle* usually solitary, terminal, often longer than the leaves, lax, minutely rusty-pubescent; bracts lanceolate or oblong, deciduous; the *flowers* ·1 in. long, shortly pedicellate, in stalked umbels on the ultimate branchlets or in subsessile fascicles. *Calyx* rusty-puberulous, with 3 or 4 short broad teeth. *Stamens* 6 or 8, alternately long and short, sagittate at the base and with a small linear appendage behind. *Petals* 3 or 4, rosy. *Capsule* less than ·1 in. long, boldly 6-ribbed. Naud. in Ann. Sc. Nat. Ser. 3, XV, 310; Triana in Trans. Linn. Soc. XXVIII, 74; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 527; Cogn. in DC. Mon. Phan. VII, 464. *Melastoma exigua*, Jack in Trans. Linn. Soc. XIV, 10, tab. 1, fig. 2; DC. Prod. III, 149. *M. impuber*, Roxb. Fl. Ind. II, 405; Wall. Cat. 4048.

MALACCA; *Griffith* 2263 & 4 (K.D.); *Maingay* 776 (K.D.); *Harvey*. PENANG; *Wallich* 4048; *Curtis* 399; *Griffith*; *King*. PERAK; *Scortechini* 227, 383; *Wray* 160; *King's Collector* 450, 2302, 3106. DISTRIB. Sumatra; *Forbes* 3062.

There is some variety in this plant as regards size and inflorescence. A slender form, which never exceeds 2 or 3 feet in height and which has smaller leaves than the type, seems worthy of separation as a variety. It appears to have been so recognised by Wallich who, in distributing his Herbarium, distinguished it by the letter *a*. A less distinctly marked form is one in which the flowers are grouped on the branches of the inflorescence in dense almost sessile fascicles.

VAR. *minor*, King. Leaves narrowly elliptic, tapering much to base and apex, 2 to 4·5 in. long; inflorescence slender, few-flowered, very lax: height only 2 to 3 feet.

PENANG; *Wallich*, Cat. 4048*a*; *Curtis* 73. PERAK; *Scortechini* 1702; *Wray* 161, 3414; *King's Collector* 2302.

2. ALLOMORPHIA WRAYI, King, n. sp. A shrub, 2 to 4 feet high; branches and petioles with flexuose, spreading, ferruginous hairs. *Leaves* 7-nerved, broadly ovate to rotund-ovate, the apex shortly and abruptly acuminate, the base narrowed, the edges obscurely and minutely bristle-toothed: upper surface very sparsely strigose or glabrous, often with minute, brown scales on the chief nerves; lower glabrous; length 5 to 9 in., breadth 3·5 to 5·5 in.; petiole 2·25 to 2·75 in. *Panicles* solitary, axillary, slightly longer than the petioles but much shorter than the leaves, glabrous or rusty puberulous towards the extremities: the branches short, spreading, rather condensed when young, few flowered. *Calyx-tube* widely campanulate, minutely rusty-puberulous or almost glabrous, without ribs; the mouth truncate, slighly waved but not toothed. *Petals* 4. *Stamens* 8, equal, the anthers lobed but not sagittate at the base, the back with a slight supra-basal appendage.

Capsule glabrous, sub-globular, slightly contracted below the sub-membranous truncate mouth, under ·1 in. in diam.

PERAK; *Wray* 2483; *King's Collector* 2061, 2380, 2773; *Scortechini* 50, 425. PENANG; *Curtis* 2008.

A species allied to *A. exigua*, Bl. but with pubescent branches and petioles, shorter and more contracted panicles, a wider, toothless calyx-tube, sub-globular capsules and equal anthers only slightly lobed at the base. In Mr. Wray's field-note on his specimens he remarks that the flowers are white and the leaves dark shining green above and crimson beneath.

3. **ALLOMORPHIA ALATA**, Scortechini Mss. A glabrous shrub, 3 to 6 feet high; the branchlets broadly winged. *Leaves* ovate or elliptic-ovate, the apex shortly acuminate; the base narrowed into the broadly-winged petiole, 5-nerved; both surfaces glabrous, the edges shortly bristle-toothed; length 5 to 10 in., breadth 2·5 to 4·5 in., petiole ·75 to 4 in. *Panicle* solitary, terminal, often nearly as long as the leaves, lax; its branches diverging, 4-angled and 4-winged, very minutely rusty lepidote-puberulous. *Flowers* clustered in small umbels near the ends of the branches, the bases of the umbels sometimes with a ring of bracteoles and minute imperfect flowers. *Calyx-tube* cylindric-ovoid, the limb expanded and with 4 small, persistent teeth. *Petals* 4, twice as long as the calyx-teeth but shorter than the filaments. *Stamens* 8, equal, exserted, much longer than the calyx-tube. *Anthers* linear-acuminate, longer than the scaberulous filaments, very slightly lobed at the base and almost inappendiculate. *Capsules* sub-globular, 8-ribbed, glabrous, the mouth truncate, diam. ·1 in.

PERAK; *Scortechini* 236; *Wray* 1327; *Curtis*; *King's Collector* 572, 2047.

The leaves of the same pair differ, often considerably, in size.

5. BLASTUS, Lour.

Shrubs. *Leaves* membranous, petiolate, ovate- or oblong-lanceolate, acuminate, entire or sinuate-serrate, 3- to 5-nerved. *Flowers* small 4-merous, ebracteolate. *Calyx-tube* oblong-campanulate or shortly oblong; the limb not expanded, truncate, minutely 4-lobed. *Petals* 4, ovate, obtuse, glabrous, convolute into a cone before expansion. *Stamens* 4, equal, the filaments thin: anther incurved subulate, opening by a single apical pore; basal lobes divaricate, the connective inappendiculate. *Ovary* adhering to the calyx, 4-celled; style filiform; stigma punctiform. *Capsule* obovoid or sub-globular, slightly 4-grooved; dehiscing slowly by 4 valves. Seeds minute, numerous, irregularly recurved, reniform. DISTRIB. 3 species in Malaya, China, Cochin China and India.

Blastus Cogniauxii, Stapf in Hook. Ic. Pl. t. 2311. A shrub, 6 to 10 feet high; young branches slender, as thick as a crow-quill, scaly, glabrous or puberulous. *Leaves* equal, oblong-lanceolate, narrowed at the base, the apex acuminate, 5-nerved (the marginal pair faint), the edges sub-entire; upper surface glabrous, with a few scattered, small glands; lower glandular-punctate, minutely furfuraceous on the nerves; length 4 to 7 in.; breadth 1 to 2·25 in., petiole ·3 to ·75 in. *Panicles* axillary or terminal, slender, much shorter than the leaves, glandular-scaly, the few divaricate branchlets bearing the flowers in dense terminal glomeruli of 6 to 9. *Calyx* shortly tubular, scaly, the teeth minute. *Anthers* narrowly ovate with many small yellow glands near the base. *Capsule* subglobular, truncate, ·1 in. in diam., subglabrous; seeds linear. *Ochthocaris parviflora*, Cogn. in DC. Mon. Phan. VII, 421.

Perak; common. Distrib. Borneo.

This is closely allied to *B. cochinchinensis*, Lour., but differs notably in its paniculate inflorescence.

6. Ochthocharis, Blume.

Small, erect, glabrous shrubs, branches round or obtusely 4-angled. *Leaves* opposite, petioled, oblong or lanceolate, 3–7-nerved, minutely denticulate-serrulate. *Flowers* minute, in axillary clustered cymes, rarely in axillary lax cymes or in lax terminal cymose panicles. *Calyx-tube* obovoid, smooth; teeth 5, small, persistent. *Petals* 5. *Stamens* 8 or 10, equal; anthers oblong, obtuse at the top, opening with one pore, at the base shortly produced or not; connective with or without an appendage. *Ovary* inferior, 4- or 5-celled, glabrous at the apex; style simple, filiform; ovules very many, placentas axile. *Capsule* globose, 5-valved, enclosed by the membranous calyx-tube. *Seeds* very many, irregularly club-shaped. Distrib. Species 5 or 6, extending from Singapore to Borneo.

Connective of anthers with no appendage at the base behind:—
  Flowers in a terminal panicle, 5-merous ... ... 1. *O. paniculata.*
  „ fascicles, 4-merous ... ... 2. *O. borneensis.*
Connective of anthers with an appendage at the base behind:—
  Erect; flowers 5-merous; leaves 3-nerved ... ... 3. *O. javanica.*
  Decumbent; flowers 4-merous; 5- to 7-nerved... ... 4. *O. decumbens.*

1. **Ochthocharis paniculata**, Korth. in Verh. Nat. Gesch. Bot. 247 t. 64. A small shrub with slender quadrangular branches, rusty pubescent towards the tips. *Leaves* membraneous, elliptic-lanceolate, tapering to each end, the edges minutely bristle-serrate, 5- to 7-nerved (the marginal pair faint); upper surface glabrous; the lower somewhat pale,

scaly-puberulous on the nerves and prominent transverse veins; length 2·5 to 5 in., breadth 1·25 to 2 in., petiole ·35 to 8·5 in. *Panicle* cymose, terminal, spreading, less than half as long as the leaves; branches opposite, pedicels unequal, bracteolate at the base, not quite so long as the flowers. *Petals* 5, ovate-acuminate. *Stamens* 10, anthers oblong, blunt, not produced at the base and with the connective inappendiculate. *Capsule* depressed-globular, glabrous, with 5 shallow grooves, ·2 in. in diam. Blume Mus. Bot. I, 40; Naud. in Ann. Sc. Nat. ser. 3, XV, 307, with fig.; Miq. Fl. Ind. Bat. I, pt. I, 556; Triana in Trans. Linn. Soc. XXVIII, 74. C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 528; Cogn. in DC. Mon. Phan. VII, 480. *Melastoma oxyphyllum*, Benth. in Wall. Cat. 4083.

SINGAPORE; *Wallich.* DISTRIB. Borneo.

2. OCHTHOCHARIS BORNEENSIS, Blume Mus. Bot. Lugd. Bat. I, 40. A shrub, 3 or 4 feet high. *Leaves* membranous, elliptic-lanceolate, 5-nerved (the lateral pair small), acuminate, the base cuneate, the edges minutely dentate, upper surface glabrous, the lower pale, minutely and furfuraceously stellate-hairy on the main and rather prominent tranverse nerves; length 3 to 4·25 in.; breadth 1·25 to 1·75 in.; petioles sparsely stellate-hairy, unequal, ·3 to 1·8 in. long. *Flowers* in fascicles of 4 to 7, from tubercles on the stem below the leaves; the buds conical, ·1 in. long; pedicels slender, ebracteolate, ·25 to ·3 in. long. *Petals* 4, broadly ovate, narrowly acuminate. *Stamens* 8; the anthers oblong, blunt, neither produced nor appendiculate at the base. *Capsule* depressed-globular, glabrous, faintly 5-grooved, ·2 in. in diam. Naud. in Ann. Sc. Nat. Ser. 3, XV, 307; Cogn. in DC. Mon. Phan. VII, 480. *O. buruensis*, Teysm. and Binn. in Nat. Tijdschr. Ned. Ind. XXV, 426; Miq. in Ann. Bot. Lugd. Bat. I, 216.

SINGAPORE; *Ridley* 6221. DISTRIB. Borneo, Molluccas.

3. OCHTHOCHARIS JAVANICA, Blume in Flora 1831, 523. A shrub, 2 or 3 feet high. *Leaves* subcoriaceous, lanceolate or oblong-lanceolate, acute, the base cuneate, 3-nerved; both surfaces glabrous and with the nerves indistinct; the lower rather pale when dry, the edges remotely bristle-serrate; length 2 to 3·5 in.; breadth ·6 to 1 in.; petiole ·2 to ·5 in. *Cymes* or fascicles about as long as the petioles, few-flowered; pedicels slender, minutely bracteolate at the base, ·15 to ·45 in. long. *Flower*-buds ·15 in. long, much pointed. *Petals* 5, broadly ovate, abruptly acuminate. *Anthers* 5, twice as long as the filaments, minutely spurred at the base behind. *Capsule* subglobular, with 5 shallow grooves, glabrous, ·15 to ·2 in. in diam.; the placentas persistent, woody, rough on their outer surfaces. Naud. in Ann. Sc. Nat. Ser. 3, XV, 307; Miq. Fl. Ind. Bat. I, pt. I, 556; Kurz, For. Fl. I, 507. Triana Melast. 74, tab. VI, fig. 67; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 528;

Cogn. in DC. Mon. Phan. VII, 480. *Melastoma? littoreum*, Wall. Cat. 4087.

A sea-shore plant, SINGAPORE, JOHORE, MALACCA, PERAK. DISTRIB. Burma, Borneo, Java.

4. **OCHTHOCHARIS DECUMBENS**, King, n. sp. A creeping or decumbent shrub, 3 to 5 feet long; stems as thick as a swan's quill, rounded, often rooting at the nodes. *Leaves* thinly coriaceous, elliptic-lanceolate, shortly acuminate, rounded or cuneate at the base, the edges obscurely bristle-serrate, 5–7-nerved; upper surface glabrous; the lower pale and with a few minute, scattered scales; length 5 to 7·5 in.; breadth 2 to 3 in.; petioles unequal, stout, sparsely scaly, ·5 to 1·25 in. long. *Flowers* in dense, axillary cymes shorter than the petioles, the pedicels short, bracteolate. *Calyx-tube* glabrous, faintly ribbed, the teeth 4, small. *Petals* 4, broadly ovate, acuminate. *Stamens* 8; the anthers curved, tapering to the truncate apex, slightly produced at the base and with a minute tubercle behind. *Capsule* depressed-globose, glabrous, faintly 4-grooved, ·18 in. in diam.

PERAK; *King's Collector*, 2833, 10425.

7. ANERINCLEISTUS, Korth.

Shrubs; branches often round. *Leaves* petioled, ovate or lanceolate, entire, 3–7-nerved. *Flowers* small. *Calyx-tube* campanulate or funnel-shaped; lobes 4, usually very small. *Petals* 4, minute, glabrous. *Stamens* 8, equal; anthers attenuate at the top, opening by one pore, scarcely produced at the base; connective with or without a short spur. *Ovary* nearly free, 4-celled; style filiform, simple; ovules many. *Capsule* splitting by 4 large valves at the summit. *Seeds* exceedingly minute, cuneate-obovoid. DISTRIB. Species 9 or 10; Malaya and Burma.

Inflorescence umbellate; leaves small, oblong- or elliptic-lanceolate:—	
Nearly glabrous in all its parts	1. *A. macranthus.*
More or less pilose:—	
Calyx-tube mealy tomentose, the teeth narrow, glandular ciliate on the edges	2. *A. Scortechinii.*
Calyx-tube not tomentose but with many long spreading gland-tipped hairs, the teeth minute and without hairs	3. *A. Curtisii.*
Inflorescence a large panicle; leaves large, ovate:—	
Panicle densely tomentose, leaves 7-nerved	4. *A. floribundus.*
Panicle clothed with short, flat, adpressed, scale-like hairs, leaves 5-nerved	5. *A. sublepidotus.*

1. **ANERINCLEISTUS MACRANTHUS**, King, n. sp. A small shrub; young branches with pale lenticels, glabrous except for a few adpressed hairs at the apices. *Leaves* nearly equal, elliptic-lanceolate, much narrowed to the base, the apex shortly acuminate; both surfaces

glabrous, the lower pale when dry; length 2·5 to 4 in., breadth ·8 to 1·5 in., petiole ·4 to ·8 in., strigose. *Umbels* axillary or terminal, usually solitary, 4- 5-flowered, on slender, sparsely strigose peduncles shorter than the leaves. *Flowers* (including the stamens) ·5 in. long. *Calyx-tube* infundibuliform, sparsely adpressed-pilose, nearly as long as the slender strigose pedicel; the mouth with 4 narrowly triangular acuminate, erect, persistent teeth nearly as long as the tube. *Petals* 4, ovate, acuminate, glabrous, slightly longer than the calyx-teeth. *Stamens* 8, slightly unequal, the alternate 4 shorter but of the same shape as the longer 4, the base in all emarginate, scarcely lobed but with a very short process behind. Scales of disc 4, their apices broadly truncate and slightly toothed. *Capsule* globose-ovoid, ·25 to ·3 in. long.

PERAK; at elevations of 2000 to 4000 feet, *Scortechini*; *Wray* 297, 1621.

A species near to *A. hirsutus*, Korth., but differing in being glabrous and in having larger flowers which, according to Mr. Wray, are pink. The umbels of this, when in bud, are enclosed in oblong, deciduous, sparsely strigose bracts.

2. **ANERINCLEISTUS SCORTECHINII**, King, n. sp. A slender shrub, 3 to 4 feet high; young branches, petioles and inflorescence with many spreading and sub-adpressed, gland-tipped hairs. *Leaves* very unequal (one of each pair very small), oblong, slightly narrowed to the rounded base, the apex acuminate, the edges ciliate; main nerves 3 to 5, the minor nerves transverse, rather faint; both surfaces usually glabrous, the upper sometimes sparsely strigose, the main nerves on both and the transverse on the lower surfaces bristle-hairy; length of the larger leaf of the pair 2·5 to 4 in., breadth ·8 to 1·4 in.; petiole ·3 to ·4 in; the smaller leaf of the pair from one-fourth to one-half as large and subsessile. *Inflorescence* axillary, solitary on a slender peduncle about as long as the smaller leaf, umbellately cymose, 6- to 10-flowered. *Calyx-tube* globose-campanulate, minutely mealy tomentose, about as long as the pedicel; teeth 4, narrow, reflexed, each ending in a bristle and the margins bearing 6 or 8 long straight hairs with small glandular apices. *Petals* 4, ovate, glabrous, shorter than the calyx-teeth, each with a slender, gland-tipped, reflexed hair at the apex. *Anthers* 8, equal, acute, very slightly lobed at the base and inappendiculate; *style* thick, straight; stigma small. *Ovary* crowned by obtuse, sometimes crenulate scales.

PERAK; *Scortechini* 51, 450; *Curtis*.

This closely resembles *A. Curtisii*, Stapf, but is distinguished at once by the calyx which has its tube covered with minute mealy pubescence while the teeth are long, reflexed, with long glandular hairs on the edges, whereas in *A. Curtisii* the calyx-tube bears many long glandular hairs and the teeth are triangular, minute and hairless. The leaves of *A. Curtisii* moreover are strigose between the nerves on both surfaces.

3. ANERINCLEISTUS CURTISII, Stapf in Kew. Bull. for 1892, p. 196. A small shrub, like *A. Scortechinii*, the young branches, petioles, and inflorescence spreading slightly and not gland-tipped; *leaves* as in *A. Scortechinii* but strigose on both surfaces. *Calyx-tube* with numerous subulate, gland-tipped, spreading hairs; the teeth minute, triangular and without hairs. *Anthers* blunt.

PENANG; *Curtis* 412.

4. ANERINCLEISTUS FLORIBUNDUS, King, n. sp. A shrub, about 15 feet high: young branches, petioles and panicles densely and shortly tawny-tomentose. *Leaves* unequal, ovate, shortly acuminate, 7-nerved at the rounded base, (the main nerve giving off a pair about 1 in. from the base); upper surface with a few short scattered bristles, the main nerves densely bristly-pubescent; lower surface with short coarse hairs especially on the nerves and veins; length 5 to 9 in.; breadth 4 to 5·5 in.; petiole 1 to 2 in., one leaf of each pair smaller than the other. *Panicle* terminal, solitary, longer than the leaves, much branched, the branches unequal and in pseudo-whorls, many-flowered, the ultimate branchlets few-flowered, cymose. *Calyx-tube* funnel-shaped, tapering into and longer than the pedicel, adpressed-pilose: the mouth truncate and with 4 small broadly triangular teeth and 4 alternating tufts of inwardly-directed hairs. *Petals* 4, shorter than the calyx-tube, broadly triangular or occasionally quadrate, apiculate, glabrous. *Stamens* 8, equal, or 2 smaller and sometimes suppressed; *anthers* curved, with two deep broad lobes at the base but no appendage. *Capsule* broadly obovoid, truncate, tapering at the base; seeds minute, broadly linear.

PERAK; *Scortechini* 249 in part; *Ridley* 5342; *Curtis* 1299.

5. ANERINCLEISTUS SUBLEPIDOTUS, King, n. sp. A shrub, 10 to 15 feet high; young branches, petioles and inflorescence densely clothed with short, flat, adpressed, scale-like pale hairs. *Leaves* somewhat unequal, ovate, shortly acuminate, on long petioles, 5-nerved, entire; upper surface glabrous except for a few minute scale-like hairs, the main nerves hairy like the petiole; lower surface much reticulate, minutely lepidote-hairy, the middle nerve hairy like the petiole; length 4 to 8 in., breadth 2 to 4 in.; petiole 1 to 1·5 in. *Panicle* terminal, solitary, erect in flower, pendent in fruit, usually longer than the leaves, few-branched; the ultimate branches unequal, short, few-flowered, some of them in pseudo-whorls, pedicels less than ·1 in. long. *Calyx-tube* ·15 in. long, (when dry) reddish, clothed with scattered, adpressed scale-like hairs, tubular-campanulate; the teeth 4, short, acute. *Petals* 4, ovate, acuminate, glabrous, shorter than the calyx-tube. *Stamens* 8,

subequal, all yellow, curved, deeply lobed at the base but inappendiculate. *Capsule* obovoid, much tapered to the pedicel, ·15 in. long (when dry), scabrid from the stiff, strigose, scale-like hairs. *Seed* minute subulate.

PERAK; *Scortechini* 310; *King's Collector* 8068.

NOTE.

I take the opportunity to describe here the undernoted new species from Borneo.

ANERINCLEISTUS GLOMERATUS, King, n. sp. A shrub; young branches, petioles, main nerves of leaves and inflorescence densely covered with short, coarse, adpressed, pale hairs. *Leaves* narrowly oblong, narrowed towards the base, the apex acuminate; upper surface glabrous but with a few scattered glands; lower surface with a few pale hairs of unequal length on the bold transverse veins; length 3·5 to 8 in.; breadth 1 to 2 in.; petiole ·5 to 1·5 in. *Panicle* solitary, terminal, very narrow, bearing a few very short, almost sessile, 4- to 6-flowered umbels. *Flowers* on pedicels about half the length of the calyx-tube. *Calyx-tube* short, campanulate, pubescent; the mouth wide and with 4 short, triangular, acute, spreading teeth alternating with tufts of hair. *Petals* 4, narrowly oblong, spreading. *Stamens* 8, equal; *anthers* slightly lobed at the base, inappendiculate. *Ovary* 4-ridged, 4-celled; ovules numerous. *Capsule* sub-globular.

BORNEO; Sarawak, *Hullett* 257.

A species resembling *A. anisophyllus*, Stapf, in the shape of its leaves. The inflorescence is however very different; and in its short subsessile panicle recalls to one's memory *A. Beccarianus*, from which its leaves distinguish it at once.

8. SONERILA, Roxb.

Low herbs, rarely half-shrubs. *Leaves* membranous or more or less fleshy, opposite, those of a pair similar in shape, although often very different in size, or distinctly heteromorphous and then often apparently alternate, usually more or less oblique, 3–7-nerved from the base or near the base, rarely pinnate-nerved. *Flowers* pink or white, in scorpioid simple or pseudo-umbellate cymes, 3-nerved. *Calyx* subcylindrical, turbinate or campanulate, 3-lobed or 3-toothed. *Petals* ovate, obovate or oblong, acute, acuminate or obtuse. *Stamens* 3, equal, rarely 6 and slightly unequal; *anthers* linear, oblong or lanceolate, obtuse, acute or (often long) acuminate, minutely 2-lobed at the base, without appendages, dehiscing with apical pores. *Ovary* attached to the calyx-tube by narrow longitudinal septa, depressed at the apex, 3-celled; *style* filiform; stigma punctate or capitellate. *Fruit* enclosed in the persistent, ultimately spongy calyx-tube and forming with it a usually more or less trigonous, subcylindrical, turbinate or hemispherical false capsule, dehiscing from the centre of the depressed top with 3 valves or 6 fine teeth. *Seeds* minute, numerous, ovoid, pyramidal or clavate, smooth or asperulous; raphe usually thick, spongy. Species over 100 throughout tropical Asia.

Leaves similar, although often very unequal in size. Stamens 3. Fruit usually smooth (see No. 12–14); valves entire, distinct, exceeding the margin of the mature calyx (§ Eu-Sonerila):—

Erect or ascending herbs with fibrous roots and without rhizome:—

Calyx very slender (also in fruit); stem with 2 somewhat raised, commissural lines. Very scantily hairy or glabrous, often much branched and small- or narrow-leaved (except No. 1) herbs:—

Leaves ovate, 1–1·7 in. by ·7–·9 in. ... ... 1. *S. epilobioides.*

Leaves much smaller or at least very much narrower:—

Anthers ·12–·18 in. long:—

Leaves oblong to elliptic-oblong, ·3–·5 by ·15–·23 in. ... ... 2. *S. calaminthifolia.*

Leaves lanceolate, 1–1·75 in. by ·15–·23 in. ... 3. *S. hyssopifolia.*

Anthers ·06–·09 in. long ... ... 4. *S. erecta.*

Calyx more or less oblong- or ovoid-campanulate; fruit turbinate or obpyramidal. Stem terete or quadrangular:—

Leaves more or less ovate, long acuminate, 1–2 in. by ·4–1 in. or still smaller, acutely and coarsely toothed, thin, 3–5-nerved from the very base; petioles long, very slender ... ... 5. *S. tenuifolia.*

Leaves usually larger, not coarsely toothed:—

Upper side-nerves starting from above the base:—

Leaves pinnatinerved, acute or acuminate at the base .. .. 6. *S. flaccida.*

Leaves not pinnatinerved (rarely subpinnatinerved in No. 7); all the side-nerves springing from near the base, rarely the uppermost from near the middle:—

Cymes distinctly peduncled:—

Anthers subacute, ·09–·12 in. long; leaves membranous, rounded or subcordate at the base ... ... 7. *S. andamanensis.*

Anthers slender, acuminate, ·2–·3 in. long:—

Stem, petioles and inflorescence minutely tomentose; leaves thinly membranous, subcordate at the base on very long and slender petioles ... ... 8. *S. populifolia.*

Stem, petioles and inflorescence with long hairs; leaves acute or rounded, but not subcordate at the base:—

Leaves membranous, more or less oblong, usually acute at the base ... 9. *S. pallida.*

Leaves somewhat fleshy, rounded at the base :—

Hairs more or less spreading, often very long, particularly on the petioles and near the leaf margins; leaves light-brown beneath ... 10. *S. rudis.*

Hairs adpressed, very soft; leaves glaucous beneath with rufous hairs 11. *S. mollis.*

Cymes sessile, reduced to few-flowered fascicles :—

Unbranched or almost unbranched herbs :—

Leaves fleshy, very dark and glabrous above, glaucous or pale-brown with rufous nerves beneath; calyx with scattered gland-tipped hairs ... ... 12. *S. albiflora.*

Leaves membranous, more or less covered on both sides with rufous flexuous hairs; calyx densely hirsute ... ... 13. *S. lasiantha.*

Suffrutescent, much branched ... ... 14. *S. suffruticosa.*

All the nerves springing from the very base of the leaf; adult leaves quite glabrous, broadly elliptic, fleshy ... ... 15. *S. elliptica.*

Herbs with short stems, springing from a creeping rhizome and with usually crowded to rosulate leaves and terminal or subterminal peduncled cymes :—

Leaves 3–7 in. by 2–4 in., 7-nerved from the very base with conspicuous subhorizontal transverse veins :—

Stem, petioles and peduncles very succulent, stout 16. *S. succulenta.*

Stem, petioles and peduncles usually slender ... 17. *S. repens.*

Leaves small; uppermost side-nerves springing from above the base; transverse veins indistinct or 0 :—

Leaves oblong to lanceolate-oblong, 2–3·7 in. by ·3–1·4 in., pinnatinerved ... ... 18. *S. muscicola.*

Leaves much smaller, not or very indistinctly pinnatinerved, lateral nerves springing from below the middle :—

Leaves oblong-lanceolate to lanceolate, acute at both ends ... ... 19. *S. saxosa.*

Leaves ovate to elliptic or oblong, rounded or subcordate at the base :—

Stem 1–3 in. long; leaves broad, crowded, in about 3 pairs; petioles ·3–·7 in. long :—

Leaves entire, not ciliate; ·9–1·7 in. by ·6–1·2 in.; petals ·35 in. long; anthers ·15–·2 in. long 20. *S. congesta.*

Leaves toothed, ciliate, ·4–·8 in. by ·4–·6 in.; petals ·25 in. long; anthers ·12–·15 in. long ... 21. *S. Griffithii.*

Stem shorter; leaves narrower, more numerous, subrosulate; ·8–1·4 in. by ·4–·6 in., often beautifully variegated; petioles up to 1 in. long, very slender ... ... 22. *S. Cyclaminella.*

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P20739

- Leaves of each pair similar in shape, but very unequal in size or one quite suppressed. Stamens 6. Fruit as in Eu-Sonerila (§ Sonerilopsis, *Miq.*) ... ... 23. *S. heterostemon.*
- Leaves of each pair very dissimilar in shape and size, one very small and more or less rotundate or reniform-cordate, often deciduous. Cymes usually from the axils of the small leaves, hence often apparently leaf-opposed. Anthers 3, oblong, obtuse, not over ·15 in. long. Fruit more or less turbinate or semiglobose, obscurely trigonous, usually conspicuously muricate; valves not or very slightly exceeding the margin of the mature calyx, often not or indistinctly separating from each other at the periphery, but each of them always splitting into 2 membranous teeth in the depressed centre of the fruit. (§ Hexodon, *Stapf*) :—
  - Cymes distinctly, densely and persistently bracteate, distinctly and often long peduncled :—
    - Cymes simple or 2 or more, sessile on a common peduncle, forming a dense head :—
      - Cymes simple, at length 1–1·5 in. long; leaves obliquely oblanceolate to obovate-oblong, 3–7 in. by 1–1·5 in. :—
        - Leaves fleshy, glabrous with the exception of the minutely strigillose nerves of the underside ... 24. *S. integrifolia.*
        - Leaves membranous, with rather long and spreading hairs beneath and along the margins ... 25. *S. bracteata.*
      - Cymes usually 2 or more, sessile on a common peduncle, very short, gathered in a dense head; leaves obliquely obovate, elliptic or oblong, 4–6 in. by 1·75–3 in. ... ... 26. *S. capitata.*
    - Cymes usually 2 or more on a common peduncle, each with a special peduncle, gathered in a loose umbel; leaves obliquely elliptic, 3–5 in. by 1·75–2·75 in. ... 27. *S. caesia.*
  - Cymes ebracteate, or indistinctly or deciduously bracteate :—
    - Cymes sessile or subsessile; peduncle, if any, less than ·5 in., when mature; fruit muricate :—
      - Cymes dense, indistinctly bracteate, sessile :—
        - Bracts linear, usually minute, or suppressed; calyx pubescent; leaves fleshy, firm when dry, glabrous above, shortly and adpressedly pubescent or tomentose beneath ... ... 28. *S. Nidularia.*
        - Bracts filiform, ciliate, hidden among long spreading hairs; calyx shaggy; leaves membranous, very hairy on both sides ... ... 29. *S. brachyantha.*
      - Cymes subsessile somewhat loose, ebracteate or deciduously bracteate :—
        - Leaves obliquely obovate-lanceolate to oblong, 2·5–6 in. by 1–2·5 in. :—
          - Leaves somewhat fleshy, firm, when dry with conspicuous transverse veins; pedicels very

slender, to ·25 in. long; calyx with short, fine, spreading hairs; fruit ·08–·1 in. long, finely muricate ... ... 30. *S. microcarpa.*

Leaves membranous with conspicuous raised transverse veins; pedicels slender, ·08–·12 in. long; calyx with long spreading hairs; fruit ·15–·18 in. long, coarsely muricate ... ... 31. *S. costulata.*

Leaves obliquely elliptic, 4–6 in. by 2·2–3·5 in.; fruit ·2 in. long ... ... 32. *S. macrophylla.*

Cymes distinctly, often long, peduncled :—

Cymes 2 or more gathered in an umbel, or if simple, then with a pair of (often minute) leaves at the middle :—

Calyx hairy; fruit muricate :—

Cymes usually compound, minutely bracteate, axis shaggy; leaves more or less hairy all over 33. *S. paradoxa.*

Cymes usually simple, deciduously bracteate; bracts small; axis shortly hairy; leaves glabrous (in the Peninsular specimens) with the exception of the very shortly and scantily hairy nerves and veins of the underside ... 34. *S. begoniaefolia.*

Calyx glabrous; fruit smooth ... ... 35. *S. glabriflora.*

Cymes simple, ebracteate; peduncle naked :—

Softly hairy or tomentose all over :—

Leaves oblong-elliptic or obovate, 2·2–2·8 in. by 1–1·2 in., petals ·18 in. long ... ... 36. *S. elatostemoides.*

Leaves oblong to lanceolate-oblong, 3–6 in. by 1–1·5 in.; petals ·35 in. long ... ... 37. *S. bicolor.*

Shortly tomentose on stem, petioles and peduncles and pubescent on the nerves on the underside of the leaves, otherwise glabrous; fruit smooth ... ... 38. *S. Calycula.*

1. SONERILA EPILOBIOIDES, Stapf and King. An erect, sparingly branched, almost quite glabrous herb, about 6 in. high. *Stem* with 2 prominent very minutely hairy lines or quite glabrous. *Leaves* of each pair similar in shape and equal or almost equal in size, ovate, acute or subacute, acuminate at the base, minutely toothed, thinly membranous, green, glabrous or with few scattered, soft, adpressed hairs above, 1–1·75 in. long by ·7–·9 in. broad, finely 5- (rarely 3-) nerved from the very base with a few delicate side nerves higher up; petiole ·4–·5 in. long, slender. *Cymes* terminal, peduncled, rather loosely 5–6-flowered, glabrous; peduncle ·6–·8 in. long, slender; pedicels at length up to ·2 in. long, very slender. *Calyx* very slender, obconical, ·25–·3 in. long; teeth broad, triangular, mucronulate. *Petals* elliptic-oblong, acuminate-apiculate, ·2 in. long, pink. *Anthers* subacute; ·12 in. long. *Style* filiform, ·12–·15 in. long; stigma subcapitate. Mature *fruit* unknown.

KEDAH; Santow, on the limestone islands, *Curtis* 2114!

2. SONERILA CALAMINTHIFOLIA, Stapf and King. An ascending or almost prostrate branched herb, from a few inches to 1 ft. high, with very minute, spreading hairs all round or along the 2 commissural lines of the stem and branches, or glabrescent below and with scattered, adpressed, short, straight or flexuous hairs on the upper side of the leaves. *Stem* terete below, quadrangular in the upper part, purple, like the branches slender and often flexuous. *Leaves* petioled, rarely the uppermost subsessile and then sometimes apparently whorled, those of a pair similar in shape and size, symmetrical, oblong to elliptic-oblong, subobtuse, narrowed into the petiole, acutely toothed with the teeth usually mucronate and the margin revolute, rather stoutly membranous or almost fleshy, pale-green, purple along the midrib, ·3–·5 in. by ·15–·23 in., 1-nerved or with 1 very fine side-nerve on each side from near the base; petioles ·08–·12 in. or less. *Cymes* terminal, 2–5-flowered, ultimately lax or flowers solitary; peduncles filiform, ·4–·8 in. long; pedicels very slender, about ·08 in. long. *Calyx* slender, obconical-oblong, ·15–·2 in. long; teeth triangular, broad, acute. *Petals* elliptic, cuspidate, about ·33 in. long, pink. *Anthers* shortly acuminate, ·12–·17 in. long. *Style* filiform, ·2 in. long; stigma punctiform. *Fruit* oblong, subtrigonous, smooth, ·25–·3 in. by ·08–·1 in.

PERAK; Gunong Batu Pateh, 4300 ft., *Wray* 1022!

3. SONERILA HYSSOPIFOLIA, Stapf and King. An erect, simple or branched herb, 6–9 in. high, with two lines of short, curled hairs on the stem and branches, and with whitish, flexuous, longer hairs on the upper side of the leaves. *Stem* subterete below, quadrangular above. *Leaves* sessile or petioled, those of a pair similar in shape and size, lanceolate, subacute, cuneate at the base or the uppermost sessile and rounded at the base, symmetrical, minutely and somewhat remotely toothed with very acute or mucronate teeth, membranous, green, pale below, 1–1·75 in. by ·15–·3 in., indistinctly 3-nerved from near the base; petioles very variable in length, up to ·4 in. long, or 0. *Cymes* few-flowered, at length lax; peduncles ·8–1 in. long, very slender, pedicels very slender, ·04–·08 in. long. *Calyx* very slender, almost cylindric, ·24–·28 in. by ·04 in.; teeth triangular, mucronulate. *Petals* elliptic-oblong, acute, ·27 in. long, pink. *Anthers* acuminate, ·12–·18 in. long. *Style* filiform, about ·18 in. long; stigma subcapitate. *Fruit* trigonous-cylindric, slightly obconical at the base, ·5 in. by almost ·1 in.

PERAK; Gunong Hijan; *Scortechini* 1426!

4. SONERILA ERECTA, Jack in Malay Misc. I, 7. A copiously branched herb, 1–1·5 ft. high, more or less hairy with the exception of the inflorescence, hairs flexuous, finely pointed, those of the stem and branches short, along 2 lines, those of the leaves longer, whitish, all over both surfaces. *Stem* subterete below, quadrangular above,

branched all along, branches more or less divaricate, 1 or, in luxuriant specimens, 2 from each leaf axil; often branched again. *Leaves* sessile or petioled, often apparently whorled on the upper or, in vigorous specimens, almost on all nodes, those of a pair similar in shape and size, lanceolate or ovate, acute or subacute, contracted or subcuneate at the base, rather symmetrical, entire or minutely toothed, membranous, green or greyish when very hairy, ·4–1·2 in. by ·2–·4 in., indistinctly 3-nerved from near the base; petioles slender, very variable in length, up to ·3 in. long, or 0. *Cymes* 2–9-flowered, at length very lax; peduncles filiform, ·4–2 in. long; pedicels very slender, ·04 in. long or hardly any. *Calyx* very slender, almost cylindric, ·15–·2 in. by ·03 in., teeth triangular, short. *Petals* elliptic-oblong, cuspidate-acuminate, ·15 in. long, pink. *Anthers* ovate-lanceolate, acute or subacute, ·06–·09 in. long. *Style* filiform, ·12 in. long; stigma punctiform. *Fruit* almost cylindric, slightly trigonous, smooth, ·3–·45 in. by ·06–·08 in. Jack in Hook. Bot. Misc. II, 63; Blume in Flora (1831), 491; Benn. Pl. Jav. Rar. 217; Naud. in Ann. Sc. Nat. Ser. 3, XV, 324; Miq. Fl. Ind. Bat. I, 563; Triana in Trans. Linn. Soc. XXVIII, 75; C. B. Clarke in Hook. f. Fl. Brit. Ind. II, 530; Cogn. in DC. Monogr. VII, 492; Stapf in Ann. Bot. VI, 304.

PENANG; Government Hill, *Curtis*, *Porter* in Wall. Cat. 4092; *Maingay* 2214 (778, Kew Distrib.). DISTRIB. Northwards as far as Moulmein.

VAR. *flexuosa*, Stapf and King. *Stems* ascending, like the very slender branches more or less flexuous. *Leaves* lanceolate to linear-lanceolate, acuminate at the base, ·4–·8 in. by ·12–·2 in., more or less pubescent or scaberulous from very short hairs, mainly above, margins usually finely but sharply toothed and often revolute. *Cymes* 3–1-flowered with capillary peduncles. *Fruit* ·27–·35 in. long, by ·6–·8 in.

PENANG; on rocks, 2000 ft., *Curtis* 1238! PERAK; Larut, on rocks in rich, moist soil, 300 to 600 ft., *Kunstler* 2364! *Scortechini* 91!

VAR. *discolor*, Stapf and King. *Stems* ascending or erect, branches very slender, slightly flexuous, very minutely hairy along lines or almost glabrous. *Leaves* oblong-lanceolate to ovate-lanceolate, minutely toothed, narrowly revolute on the margins, very pale beneath, 3–5-nerved near the base, nerves fine, but rather distinct. *Cymes* 4–1-flowered, rather congested, also when mature. *Anthers* ·08–·09 in. *Fruit* oblong-cylindric, ·3–·35 in. by ·08 in.

PERAK; *Scortechini* 160!

5. SONERILA TENUIFOLIA, Blume in Flora 1831, 491. An erect or ascending, branched or unbranched herb, 6–12 in. high, usually with scattered, spreading, gland-tipped hairs in the upper part of the stem, on the peduncles and pedicels, and near the mouth of the calyx and with few

adpressed, finely attenuated, pale hairs on the upperside of the blades, rarely almost quite glabrous. *Stem* slender, terete below, more or less quadrangular upwards. *Leaves* of a pair similar in shape, but unequal in size, ovate to ovate-lanceolate, long acuminate, symmetrical or slightly asymmetrical and rounded at the base, acutely and coarsely toothed, thinly membranous, dark- or pale-green, the larger 1–2 in. by ·4–1 in., distinctly 3-, rarely 4–5-nerved from the very base, very faintly pinnate-nerved higher up; petioles very slender, reaching 1·5 in. in length, purple. *Cymes* 1–6-flowered, almost pseudo-umbellate; peduncle ·5–1 in. long, like the slender pedicels purple or crimson, the latter ·25–·3 in. long. *Calyx* campanulate-oblong to ovoid-oblong, about ·15 in. long; teeth distinct, triangular. *Petals* elliptic, apiculate, ·3–·35 in. long, glabrous, rose-coloured. *Anthers* lanceolate-acuminate, acute or subobtuse, ·12–·13 in. long. *Stigma* capitate. *Fruit* trigonous, obconical, ·23–·27 in. long, smooth; valves ·23 in. broad. Benn. Pl. Jav. Rar. 211, t. 44; Naud. in Ann. Sc. Nat. ser. 3, XV, 324; Miq. Fl. Ind. Bat. I, 563. Triana in Trans. Linn. Soc. XXVIII, 76; C. B. Clarke in Hook. f. Fl. Brit. Ind. VIII, 536. Stapf in Trans. Linn. Soc. 2nd Ser. IV, 156; Cogn. in DC. Monogr. VII, 502; Stapf in Ann. Bot. VI, 301.

PERAK; *Scortechini* 312! *Kunstler* 722! *Wray* 427! on Gunong Batu, 4500 ft., *Wray* 273! 406. MALACCA; Mt. Ophir, *Maingay* 2582! DISTRIB. Sumatra, Java, Borneo.

VAR. *hirsuta*, Stapf and King. Leaves hairy on both sides; hairs copious at least above, longer, wavy or curled, less adpressed than in the type; blades often very small (0·6 in. by 0·3 in.); flowers solitary.

PERAK; *Scortechini* 790! Larut, top of Gunong Bubu, 5000-5300 ft., *Kunstler* 7406! *Wray* 3841!

6. SONERILA FLACCIDA, Stapf and King. An erect or ascending, usually branched herb, ·5–1 ft. high, with a very fine, furfuraceous, dark rusty and often scanty indumentum in the lower part and on the underside of the leaves (at least on the nerves), otherwise glabrous. *Stem* quadrangular. *Leaves* of a pair similar, equal or unequal in size, oblong or oblong-elliptic, subacute or subacuminate at both ends, or the tips obtuse, sometimes decurrent at the base, entire or nearly so, symmetrical or more or less asymmetrical, thinly membranous, dark- or light-green and often spotted with white circular or elliptic spots above, whitish green beneath, 2–4 in. by ·75–1·75 in., pinnate-nerved, distinct side-nerves usually 3 on each side, the others like the tertiary nerves very faint or quite obscure; petiole up to ·6 in. long, often very short, slender. *Cymes* terminal and axillary, short, few- to 9-flowered, peduncled, peduncle very slender, ·75–1 in. long; pedicels very slender, ·08–·15 in. long. *Calyx* slender, obconical to oblong, ·13–·15 in. long, rose-coloured, teeth triangular, very short and broad. *Petals* oblong, acute, ·15 in.

long, rose-coloured. *Anthers* acute, ·12 in. long. *Style* filiform; stigma capitate. *Fruit* trigonous, truncate-obovate, ·2 in. long, smooth; valves ·12 in. broad.

PERAK; Gunong Panti, 600–800 ft., *Kunstler* 219! *Ridley* 4184! Gunong Inas, 3500 ft., *Wray* 4066! 4067!

Certain small specimens, collected by Scortechini in Perak (272), represent only a dwarf state of *S. flaccida*; their larger leaves measure 1–1·5 in. by ·6–·8 in.

7. SONERILA ANDAMANENSIS, Stapf and King. An erect or ascending, branched or unbranched herb, 3–6 in. high, more or less hirsute, particularly on the stem and petioles, with flexuous, finely pointed hairs. *Stem* reddish-brown when dry, quadrangular. *Leaves* rather approximate, those of a pair similar in shape and size, or more or less unequal, ovate to ovate-oblong, acute or subacuminate, rounded or subcordate and often slightly asymmetrical at the base, membranous, green or purple above, purplish glaucous below, length 1·5 to 3·3 in., breadth 1 to 1·7 in., 5–8-nerved from below the middle, the lower nerves more or less opposite, the uppermost 1 or 2 usually alternate, transverse veins oblique, fine or obscure; peduncle ·5–1·5 in. long. *Cymes* few- to many-flowered, much contracted, peduncles solitary and terminal, or 2–4 from the top and the uppermost leaf-axils, 1–2 in. long; pedicels slender, up to ·1 in. long, like the flowers with scanty and sometimes minutely gland-tipped hairs. *Calyx* very slender, obconical, up to ·2 in. long; teeth short, broad, triangular. *Petals* elliptic, acuminate, ·25 in. long, rose-coloured. *Anthers* ovate-lanceolate, subacute, ·09–·12 in. long. *Style* filiform, ·2–·25 in. long; stigma capitate. *Fruit* oblong with a cuneate base, ·22–·27 in. long, smooth; valves scarcely ·1 in. broad.

ANDAMANS; Mount Harriet near Port Blair, on rocks, *King's Collector* 48!

8. SONERILA POPULIFOLIA, Stapf and King. An erect or ascending, simple or sparingly branched herb, 6–9 in. high, more or less covered with minute hairs and with a few soft, adpressed, whitish, small bristles on the surface and the margins of the ultimately often glabrescent leaves, with the hairs of the inflorescence often minutely gland-tipped. *Stem* finely rusty-tomentose, subterete below, quadrangular above. *Leaves* of a pair similar in shape and equal or somewhat unequal in size, ovate, acute or acuminate, usually minutely cordate at the base, with the lobes often more or less unequal and close, subentire or toothed in the upper part, thinly membranous, light-green, 1·5–3 in. by 1·2–1·75 in., finely 7-nerved from near the base, upper pair ·2–·3 in. from the base; petioles very slender, 1–2 in. long, finely tomentose. *Cymes* few- to 12-flowered, much contracted and almost umbelliform, terminal; peduncle slender, ·5–1·2 in. long; pedicels slender, ·15–·22 in. long.

Calyx subcampanulate-oblong, ·18–·2 in. long; teeth broad, triangular. *Petals* elliptic, shortly acuminate, ·3–·4 in. long, deep- to blueish-pink. *Anthers* acuminate, tips sometimes very fine and curved, ·2–·3 in. long. *Style* filiform, ·35–·45 in. long; stigma minutely capitate. *Fruit* trigonous, truncate-obovoid, ·2–·25 in. long, smooth, often finely puberulous; valves ·15–·16 in. broad.

PERAK; *Scortechini* 136! 300–500 ft., *King's Coll.* 10055! Larut, dense jungle, 500–800 ft., *King's Coll.* 5791! Briah plains, *Wray* 4201! Tapah, *Curtis!*

The uppermost pair of leaves is often much reduced, resembling a pair of bracts. One of the leaves of the preceding pair is sometimes suppressed, whilst the peduncle and the petiole of the other leaf are so turned that the latter seems to form the continuation of the axis; hence the former appears to spring from a long petiole. This is chiefly the case with the inflorescences which terminate branches.

9. SONERILA PALLIDA, Stapf and King. An ascending, branched or unbranched herb, 6–12 in. high, hirsute all over, but chiefly on the stems and petioles, hairs pale reddish when dry, those of the inflorescence short, stiff and spreading. *Stem* decumbent at the base, rooting in the lower part, quadrangular. *Leaves* of a pair similar in shape, but usually rather unequal in size, oblong to ovate-oblong, acuminate, symmetrical or more or less asymmetrical and acute (rarely obtuse) at the base, minutely denticulate, membranous, light green, the larger 1·5–4 in. by ·8–1·8 in., finely but distinctly 5–7-nerved from near the base, the upper pair ·4–·6 in. from the base, petioles up to ·6–·75 in. long. *Cymes* few- to 8-flowered, short, on apparently terminal peduncles; peduncles slender, 1–2 in. long; pedicels ·08–·15 in. long, slender. *Calyx* slender, trigonous, obconical-campanulate, ·15–·2 in. long; teeth distinct, triangular. *Petals* elliptic-oblong, apiculate, ·45–·5 in. long, with a line of short, stiff, spreading hairs on the back, pale pink. *Anthers* acuminate, slender, ·23–·24 in. long. *Style* filiform, stigma punctiform. *Fruit* trigonous, obconical, ·25–·3 in. long, sparingly muricate, valves ·15 in. broad.

PERAK; Gunong Inas, 5000 ft., *Wray* 4100! MALACCA; Bujong, *Curtis* 3155! SELANGORE; Bukit Hitam, 2500–3500 ft., *Kelsall! Ridley* 7320!

10. SONERILA RUDIS, Stapf and King. A semidecumbent, sparingly branched or unbranched herb, about 1 ft. high, densely clothed with short, or often very long, fine and spreading, curved or curled hairs on the stem and petioles, with somewhat coarse, more or less adpressed hairs on both sides of the leaves and gland-tipped, spreading hairs on the peduncles, pedicels, calyx and the midrib of the petals, hairs reddish when dry. *Stem* often rooting in the lower part, terete or subquadrangular

in the upper part. *Leaves* of a pair similar, subequal or rather different in size, ovate to oblong or elliptic, acute or subacuminate, rounded at the base, entire, somewhat fleshy, green above, pale beneath, distinctly 7-nerved from near the base (upper pair ·2–·25 in. above the base); petioles ·4–1·2 in. long. *Cymes* 2–6-flowered, umbelliform, terminal, peduncled; peduncle slender, ·5–1 in. long; pedicels ·08–·1 in. long. *Calyx* rather slender, subcampanulate, ·12–·15 in. long; teeth short, broad, triangular. *Petals* elliptic to obovoid, obtuse or subacute, ·5-·6 in. by ·35-·4 in., pink, with a line of gland-tipped hairs on the back. *Anthers* acuminate, slender, ·23–·27 in. long. *Style* filiform; stigma punctiform. *Fruit* trigonous, shortly obconical, about ·27 in. long, muricate, on stout muricate pedicels; valves ·2 in. broad.

PERAK; *Scortechini!* Tumbung Parbat, *Scortechini* 422! Gunong Batu Pateh, 4500 ft., *Wray* 260. MALACCA; Bujong, *Curtis* 3297!

11. SONERILA MOLLIS, Stapf and King. An ascending, sparingly branched or unbranched herb, about 1 ft. high, densely and adpressedly tomentose along stem and petioles, and on the underside of the leaves along the nerves, and besides almost cobwebby on both sides of the young leaves; all the hairs soft and reddish when dry. *Stem* often rooting in the lower part, terete or subquadrangular in the upper part. *Leaves* of a pair similar, but differing more or less in size, elliptic to ovate-elliptic, shortly and acutely acuminate, rounded at the base, entire, somewhat fleshy, very dark green and quite glabrous above when adult, pale and glabrescent beneath between the nerves, the larger 2–3 in. by 1–2 in., distinctly 5–7-nerved from near the base (upper pair of side nerves ·25–·27 in., distant from the base); petioles ·4—1 in. long. *Cymes* 2–4-flowered, umbelliform or flowers solitary, terminal, peduncled, glabrous; peduncle about ·5 in. long, slender; pedicels ·2–·24 in. long, very slender. *Calyx* slender, subcampanulate, ·18–·2 in. long; teeth very short and broad, triangular. *Petals* elliptic-oblong, acute, ·4 in. long. *Anthers* acuminate, ·2–·22 in. long. *Style* filiform; stigma punctiform. *Fruit* trigonous, shortly obconical, ·24 in. long, smooth; valves ·2–·24 in. long.

PERAK; *Wray, Scortechini!* Summit of Gunong Batu Pateh, 6700 ft., *Wray* 375!

12. SONERILA ALBIFLORA, Stapf and King. An ascending or suberect, more or less branched herb, 9–12 in. high, densely and adpressedly hirsute along stem and petioles and more sparingly on the underside of the leaves, and with gland-tipped spreading hairs on pedicels, calyx and midrib of petals. *Stem* rather slender, terete or subquadrangular in the upper part. *Leaves* of a pair similar and rather equal in size, lanceolate to ovate- or obvate-lanceolate, acute or subacuminate at both ends, entire or almost so, fleshy, very dark green (almost black when

dry) and glabrous above, pale and adpressedly hairy beneath (at least on the nerves), 1–3 in. by ·5–1·25 in., distinctly 3–5-nerved from near the base; petioles ·2–·4 in. long. *Flowers* axillary and terminal, solitary or paired; pedicels ·1–·2 in. long, slender. *Calyx* subcampanulate, ovoid, ·1 in. long; teeth distinct, broadly triangular. *Petals* oblong, apiculate, ·2 in. long, white, with a line of gland-tipped hairs beneath. *Anthers* oblong, obtuse, ·08–·1 in. long. *Style* slightly and gradually thickened upwards; stigma punctiform. *Fruit* trigonous, shortly obconical, ·2 in. long, very scantily muriculate; valves ·2 in. broad.

PERAK; *Scortechini* 1886! Gunong Kledang, 1000 ft., *Curtis* 3293! *Ridley* 9691! *Goldham*! Kinta in dense jungle, 3500–4000 ft., *King's Collector* 7169!

13. SONERILA LASIANTHA, Stapf and King. An erect herb, 4–6 in. high, hirsute all over with flexuous, finely pointed, rufous hairs. *Stem* terete, with the hairs more or less adpressed. *Leaves* of a pair similar in shape, very unequal in size, obliquely lanceolate or subovate, acute, attenuated at the base, membranous, green above, pale beneath, the larger 1·5–3 in. by ·6–·8 in., with 2–3 side-nerves in the broader and 1 in the narrow half, the uppermost ·75–1 in. above the base; petiole slender, ·3–·6 in. long. *Fascicles* few-flowered, terminal and axillary, subsessile; pedicels rather stout, ·1–·15 in. long. *Calyx* obconical, densely hirsute, ·15–·18 in. long. *Petals* oblong, cuspidate-acuminate, ·12 in. long. *Anthers* oblong, subacute, ·06 in. long. *Style* filiform, rather stout; stigma punctiform. *Fruit* broad, obconical, muricate, to ·25 in. long; valves ·18–·2 in. broad.

PERAK; Gunong Bubu, *Wray* 3863! (in part).

The specimen which we have here in view is so different in habit and in the size of the comparatively long peduncled leaves from the others bearing the same number in Wray's collection, but described under *S. suffruticosa*, that we believe ourselves justified in considering it for the present as a distinct species.

14. SONERILA SUFFRUTICOSA, Stapf and King. An erect, repeatedly branched half-shrub, over 1 ft. high, shaggy all over from coarsely adpressed, crimson (reddish, when dry) hairs, or glabrescent at length at the base. *Stem* terete, woody below, hollow. *Leaves* mainly crowded near the tips of the branches, those of a pair similar in shape, but rather unequal in size, oblong to ovoid-oblong, acute, more or less asymmetrical or almost symmetrical and acute at the base, obscurely serrate or toothed, thickly membranous, dark green above, paler beneath, the larger 1–1·4 in. by ·4–·6 in., 3–5-nerved from near the base; petioles ·25 in. long to very short. *Flowers* unknown (petals white according to Wray). *Fruits* axillary, solitary or in pairs on stout short pedicels, obconical, ·2 in. long, strigose from tubercle-based hairs, or muricate from their persistent bases; valves ·12 in. broad.

PERAK; Larut, Gunong Bubu, 5000 ft., *Wray* 3863! (in part).

15. SONERILA ELLIPTICA, Stapf and King. An erect or ascending, usually unbranched herb, 6–9 in. high, with a very fine, furfuraceous, dark-rusty indumentum in the lower parts and on the young leaves, glabrous or soon glabrescent higher up. *Stem* somewhat stout and succulent, terete. *Leaves* of a pair similar in shape, slightly unequal or equal in size, broadly elliptic, rarely ovate or almost orbicular, very obtuse, usually symmetrical and rounded or subcordate at the base, minutely and inconspicuously toothed, thick, fleshy, dark-green, often mottled with white along the nerves above, waxy yellowish-green beneath, 1–2·5 in. by ·75–2 in., distinctly 5-nerved from the very base, upper nerves usually quite indistinct; petioles 1–2 in. long. *Cymes* many-flowered, dense, axis at length up to ·75 in. long; peduncle slender, 1–2·5 in. long, pedicels at length up to ·2 in. long. *Calyx* obconical, trigonous, ·12 in. long, glabrous, teeth distinct, broad, triangular. *Petals* oblong, apiculate, ·2–·23 long, glabrous, pinkish white. *Anthers* oblong, obtuse, scarcely ·1 in. long. *Stigma* punctiform. *Fruit* trigonous, obconical, ·15 in. long, smooth; valves ·12 in. broad.

PERAK; Kinta, on limestone rocks, 500–800 ft., *Kunstler* 7037! 7225! Sungie Siput, *Curtis* 3156!

16. SONERILA SUCCULENTA, Stapf and King. A succulent, erect herb, quite glabrous with the exception of a very few gland-tipped hairs on the calyx. *Stem* stout, very short to 3 in. long, very fleshy. *Leaves* few, crowded, of a pair equal, symmetrical or almost so, long-petioled, elliptic to ovate-elliptic, rather long and acutely acuminate, rounded at the base or very slightly subcordate, entire, very thinly membranous when dry, 6–7 in. by 3–4 in., 7-nerved from the base, with lax, subhorizontal transverse nerves, petioles succulent, 2–4 in. long. *Cymes* terminal and axillary, 2–5 on a long common peduncle, subebracteate, rather few-flowered, very short and dense; common peduncle stout, 4–7 in. long; special peduncles 1 to over 3 in. long, bracts very minute, subulate, the lower soon deciduous; pedicels hardly any. *Calyx* oblong-campanulate, up to ·25 in. long; teeth short, triangular. *Petals* oblong, cuspidate-acuminate, ·18 in. long. *Anthers* long-acuminate, incurved, over ·25 in. long. *Style* ·35 in. long; stigma subcapitate. *Fruit* subtrigonous, obconical, smooth, up to ·25 in. long; valves over ·15 in. broad.

PERAK; Maxwell's Hill, 3000 ft., *Scortechini* 279!

17. SONERILA REPENS, Stapf and King. A herb with a long creeping rhizome and a very short succulent stem bearing 2–3 usually much approximated pairs of leaves, with few, whitish, more or less adpressed, papilliform hairs on both sides of the leaves and with very few, minute, gland-tipped hairs on the stems, petioles and inflorescences, or glabrous with the exception of the leaves. *Leaves* of a pair similar in shape,

equal or, more usually, very unequal in size, ovate, rarely oblong, acutely acuminate, cordate, rounded or rarely subacute at the base, rather symmetrical, entire or slighty wavy and denticulate, thinly membranous, dark- or pale-green, the larger 3–7 in. by 2–4·5 in., distinctly 7-nerved from the very base, with somewhat distant transverse veins; petioles 1–2·5 in. long, slender or stout, fleshy. *Cymes* long-peduncled, often many-flowered, solitary or usually 2–4 on a common subterminal peduncle from the leaf axils or close to the top; peduncle 2–5 in. long, first slender, at length rather stout, pedicels slender, ·1–·12 in. long. *Calyx* slender, obconical-campanulate, ·2 to ·23 in. long; teeth triangular. *Petals* elliptic, acute, ·2–·25 in. long, white or greenish white. *Anthers* slender, acuminate, ·23–·27 in. long. *Style* filiform; stigma punctiform. *Fruit* trigonous, obconical with straight sides, ·22–·3 in. long, smooth; valves ·15–·16 in. long.

PERAK; 2000–4000 ft., common, *Curtis* 2015! *Scortechini* 1911! Maxwell's Hill, *Scortechini* 18/*a*! *Ridley*! Larut, on rocks in dense jungle, 2000 ft., *Kunstler* 2005! in open jungle on hill sides, 500–800 ft., *King's Collector* 5152! Kinta, *Curtis*! MALACCA; Bujong, 3000 ft., *Curtis*!

18. SONERILA MUSCICOLA, Stapf and King. A flaccid, ascending, unbranched herb, 4–6 in. high, with a creeping rhizome, with pale, fine, curved or curled hairs in the upper part of the stem and the leaves, and with scanty, gland-tipped hairs on the pedicels, calyx and on the back of the petals. *Stem* slender, weak, quadrangular. *Leaves* of a pair similar in shape and size, oblong to lanceolate-oblong, subacute or subacuminate at both ends, symmetrical or almost so, minutely toothed or almost entire, thinly membranous, pale-green, 2–3·7 in. by ·8–1·4 in., pinnate-nerved, nerves 3–4 on each side, fine, very oblique; petiole ·3–·8 in. long. *Cymes* few-flowered, terminal, peduncled, umbelliform, peduncles very slender, 1–1·5 in. long; pedicels very slender, ·08–·12 in. long. *Calyx* slender, obconical-campanulate, ·2 in. long; teeth triangular, broad. *Petals* elliptic, apiculate, ·35–·4 in. long, pink, with a few gland-tipped hairs along the middle nerve beneath. *Anthers* very slender, acuminate, tips curved, ·22–·24 in. long. *Style* filiform; stigma punctiform. *Fruit* trigonous, truncate-obovoid, ·2 in. long, smooth; valves ·12 in. broad.

KEDAH; Gunong Raya, on mossy trees, *Curtis* 2573!

19. SONERILA SAXOSA, Stapf and King. An erect, delicate herb, 2–4 in. high, scantily hairy with the exception of the glabrous flowers, hairs pale, flexuous with long, fine tips; with a slender, creeping rhizome. *Stem* very slender, quadrangular. *Leaves* in 3–4 pairs (of which the upper are rather close), those of a pair similar in shape and size, oblong-lanceolate to lanceolate, acute at both ends, rather symmetrical,

finely toothed in the upper part or almost entire, membranous, green above, purplish beneath, ·8–1·7 in. by ·3–·6 in., 5–7-nerved from below the middle; petiole ·2–·3 in. long. *Cymes* 4–7-flowered, much contracted, terminal; peduncles very slender, ·5–1·5 in. long; pedicels very slender, ·15 in. long, glabrous. *Calyx* very slender, linear-subcampanulate, ·15 in. long, teeth broad, triangular. *Petals* elliptic, acuminate, cuspidate, ·3–·35 in. long, pink. *Anthers* acuminate, ·19 in. long. *Style* filiform, ·3 in. long; stigma punctiform. *Fruit* obconical, truncate, sides almost straight, passing into the thickened pedicel, ·25 in. long; valves ·12–·15 in. broad.

PENANG; Government Hill, 2500 ft., on rocks in damp shady ravines; *Curtis !*

20. SONERILA CONGESTA, Stapf and King. An erect or suberect, rather delicate herb, 3–3·5 in. high, quite glabrous with the exception of an extremely scanty, furfuraceous, dark-rusty indumentum in the lower part; with a slender, creeping rhizome. *Stem* 1–1·5 in. long (exclusive of the peduncle), quadrangular. *Leaves* in about 3 crowded pairs, those of a pair similar in shape and size, broad, ovate to elliptic, obtuse or subobtuse, rounded or obscurely cordate at the base, rather symmetrical, subentire, thinly membranous, green, ·9–1·7 in. by ·6–1·2 in., 5–7-nerved from near the base, upper pair ·4–·6 in. from the base; petiole slender, ·6–·7 in. long. *Cymes* 4–9-flowered, contracted; peduncles slender, 1·2 in. long; pedicels slender, ·12–·15 in. long. *Calyx* slender, subcampanulate-oblong, ·15 in. long; teeth triangular, short. *Petals* elliptic-oblong, cuspidate-acuminate, ·35 in. long, pink. *Anthers* acuminate, ·15–·2 in. long. *Style* filiform, ·25–·3 in. long; stigma punctiform. *Fruit* (semimature) obovoid-oblong, ·15 in. long.

KEDAH; Gunong Chinchang, *Curtis* 2572 !

21. SONERILA GRIFFITHII, C. B. Clarke in Hook. f. Fl. Brit. Ind. II, 539. An ascending, delicate herb, quite glabrous with the exception of the margins and sometimes the upper surface of the leaves; with a rather stout rhizome. *Stems* very slender, 2–3 in. long (exclusive of the panicle), rooting from the lower, soon leafless nodes, quadrangular. *Leaves* in 3-4, often crowded pairs, those of a pair similar in shape and size, broad, ovate to rotundate-elliptic, obtuse or subobtuse, obscurely cordate, rarely subobtuse at the base, rather symmetrical, toothed and ciliate on the margin, membranous, green, ·4–·8 in. by ·4–·6 in., 5-nerved from near the base, upper pair ·1 in. from the base; petioles slender, ·3–·5 in. long. *Cymes* 2–3-flowered, much contracted, peduncles slender, 1–2·2 in. long; pedicels very slender, ·1 in. long. *Calyx* slender, subcampanulate-oblong, ·12 in. long; teeth triangular-ovate. *Petals* elliptic-oblong, cuspidate-acuminate, scarcely ·25 in. long, pink. *Anthers* acuminate, ·12–·15 in. long. *Style* filiform, not quite ·25 in. long; stigma

punctiform. *Fruit* truncate, obovoid-oblong, cuneate at the base when quite ripe, ·19–·23 in. long, obtusely trigonous. Cogn. in DC. Mon. VII, 513; Stapf in Ann. Bot. VI, 308.

MALACCA; Mt. Ophir, on dripping places, *Griffith* 2300! *Maingay* 2583! *Lobb* 182.

22. SONERILA CYCLAMINELLA, Stapf and King. A rather delicate, perfectly glabrous, almost acaulescent herb, with a creeping rhizome. *Stem* usually extremely short, quadrangular. *Leaves* in about 4 pairs, almost crowded into a rosette, those of a pair similar in shape and size, ovate to oblong-obtuse or subobtuse at both ends or subcordate at the base, rather symmetrical, undulate-crenulate or almost entire, membranous, light or dark brownish green above with silvery bands along the midrib and often also along the side, nerves more or less rich violet underneath, ·8–1·4 in. by ·4–·6, distinctly although finely 5–7-nerved below the middle, often with 1 or 2 delicate side-nerves higher up; petioles slender, ·4–1 in. long. *Cymes* 2–5-flowered, very much contracted; peduncles slender, 2–5 in. long, pedicels slender, ·08–·1 in. long. *Calyx* slender, subcampanulate-oblong, ·12–·15 in. long; teeth triangular, short. *Petals* elliptic, cuspidate-acuminate, scarcely ·25 in. long, light pink. *Anthers* acuminate, ·12 in. long. *Style* filiform, ·25 in. long; stigma minutely subcapitate. *Fruit* truncate, obovoid, obtusely trigonous, ·12–·16 in. long.

PERAK; on rocky hilltops, 800–1000 ft., *King's Collector* 10745! 10746! 10744 (in part)!

VAR. *canescens*, Stapf and King. Leaves more or less covered above with long, flexuous, white hairs; some of Ridley's specimens have leaves up to 3 in. by 1·2 in.

PERAK; with the type; *King's Collector* 10744 (in part)! SELANGORE; Bukit Kinta, 3000 ft., on rocks, *Ridley* 7318!

23. SONERILA HETEROSTEMONA, Naud. in Ann. Sc. Nat. Ser. 3, XV, 326, t. XVIII, fig. 4. An erect or ascending, often branched herb, ·5–2 ft. high, rarely quite dwarf, quite glabrous apart from an extremely fine, furfuraceous, rusty indumentum in the younger parts and, occasionally, a few scattered, short, whitish hairs on the upper surface of the leaves. *Stem* somewhat stout, quadrangular. *Leaves* of a pair similar in shape, but usually very unequal or one arrested at a very early stage or quite suppressed, rarely both more or less equal, usually conspicuously asymmetrical, obliquely ovate, subacute or shortly acuminate, rounded or shortly narrowed at the base, minutely toothed, membranous, metallic green, often spotted above, purplish beneath on the nerves, 1·5–4·5 in. by 1–2·3 in., 5-6-nerved from the very base with fine, lax, more or less horizontal transverse veins; petioles very unequal in length, ·5–2 in. long. *Cymes* axillary and terminal, much contracted

and compact, very many-flowered, distinctly bracteate, at length 1–2.5 in. long, peduncle ·6–1·2 in. long; bracts spathulate or obovate, very obtuse, up to ·2 in. long, persistent; pedicels hardly any. *Calyx* short, obconical-oblong, ·15–·16 in. long; teeth obscure, very obtuse. *Petals* elliptic, obtuse, pink, ·15 in. long. *Stamens* 6, 3 slightly curved, purple, ·15 in. long, 3 straight or almost so, yellow, ·12–·15 in. long. *Fruit* subsessile, turbinate, ·19–·23 in. long; valves ·19 in. broad. Miq. Fl. Ind. Bat. I, 565; Triana in Trans. Linn. Soc. XXVIII, 77; C. B. Clarke in Hook. f. Fl. Brit. Ind. II, 540. *S. obliqua*, Cogn. in DC. Monogr. VII, 515; and Stapf in Ann. Bot. VI, 310 (in part), not of Korth.

PERAK; *Scortechini!* Ipoh, *Curtis* 3158! Changkal Serdang, *Wray* 783! Larut, *Scortechini* 54/*a*! Goping, *Kunstler* 787! Tapa, *Wray* 1308. MALACCA; *Griffith* 2302! 2294! *Maingay* 1223! (782, Kew Distr. partly), *Cuming* 2349! *Lobb* 183! in dense forest between Jassing and Ayer Bombon, *Maingay* 1425! (782, Kew Distrib. partly). MALACCA; Batang, *Holmberg* 876! Ulu Gujah, *Harvey!* (dwarf specimens). SINGAPORE; *Maingay* 3098! (782, Kew Distrib. partly); Bukit Timah, *Hullet* 893! PAHANG; Tahan, *Ridley!* (dwarf specimens). DISTRIB. Sumatra to Borneo.

24. SONERILA INTEGRIFOLIA, Stapf in Ann. of Bot. VI, 312. An erect or ascending, simple or branched herb, ·5–1·3 ft. high, rufously strigose on the stem, the petioles, the nerves on the underside of the leaves and the inflorescence, including the calyx, but exclusive of the bracts, hairs of the leaves very tightly adpressed, like those of the inflorescence very short. *Stem* rather robust, often swollen at the nodes, subflexuous, almost woody below. *Leaves* very dissimilar, the larger of a pair asymmetrical, rarely symmetrical, usually obliquely oblong-lanceolate to obovate-oblong, distinctly (sometimes long) acuminate, minutely cordate or acute at the base, entire, sometimes with slightly wavy margins, somewhat fleshy, soft, quite glabrous above, dark- or yellowish-green, 3–5 in. by 1–1·5 in., sub-5-nerved from near the base with the lowermost pair of nerves faint, and the uppermost (in the narrow half) ·2–1·2 in. above the base, with fine oblique transverse veins; small leaves minute, ovate to rotundate, often cordate, sessile or shortly petioled. *Cymes* terminal and apparently leaf-opposed, peduncled, bracteate, few- to many-flowered, very dense, up to 1 in. long, peduncles very short to ·5 in. long; rhachis often flexuous when long; bracts oblong to linear-lanceolate, fleshy, up to ·12 in. long, often much smaller, sometimes extremely numerous and crowded; pedicels very short or 0. *Calyx* oblong-campanulate, nearly ·1 in. long; teeth triangular, up to ·04 in. long, acute. *Petals* oblong, acute, ·15 in. long, white to pink. *Anthers* oblong, obtuse, almost ·1 in. long. *Style* ·2 in.

long; stigma punctiform. *Fruit* semiglobose-turbinate, ·12–·18 in. long and wide, bullate-muricate.

PERAK; Larut, 200–800 ft., *Kunstler* 1917! 2791! Changkal Serdang, *Wray* 755! Blanda Mobok, *Wray* 3954! Maxwell's Hill, *Scortechini* 16*a*! Hermitage, *Curtis* 1302! SELANGOR; Dusun Tua, *Ridley* 7334! Kwala Tampan Caves, *Ridley* 306!

VAR. *acuminatissima*, Stapf and King. Leaves mostly very long and finely acuminate, on the whole narrower and less asymmetric than in the type, margins often slightly wavy to remotely serrulate, not rarely with a row of white spots close to them. *Petals* white.

PERAK; Larut, 1800–4000 ft., in dense old jungle, *Kunstler* 2004! 2161!

25. SONERILA BRACTEATA, Stapf and King. An erect or ascending, unbranched or very scantily branched herb, ·5–1·5 ft. high, softly and densely hirsute to tomentose from rufous, flexuous or curved, more or less spreading, fine hairs in all parts with the exception of the upper side of the leaves which is glabrous apart from scattered, adpressed, pale bristles. *Stem* rather stout below with swollen nodes, subflexuous, leafy part 2 to over 6 in. long. *Leaves* very dissimilar, the larger of a pair shortly petioled, somewhat asymmetrical, oblanceolate, long and finely acuminate, unequally cordate at the base with a small rounded lobe on the outer, and a still smaller or obscure lobe on the inner side, entire, ciliate along the margin, membranous, light-green, 3–7 in. by 1–1·7 in., 5-nerved from near the base (the uppermost nerve ·5–1·5 in. above the base), with oblique, transverse veins; petioles ·2 to ·4 in. long; small leaves reniform, very minute or up to ·3 in. in diam. *Cymes* terminal and axillary, long-peduncled, very dense, subcapitate at first, at length to 1·5 in. long, multibracteate, many-flowered; peduncle rather slender, up to 2 in. long; bracts linear, membranous, ciliate, up to ·12 in. long; pedicels very short. *Calyx* shortly oblong-campanulate, ·07–·08 in. long; teeth lanceolate-triangular, about ·04 in. long. *Petals* oblong, cuspidate-acuminate, white, ·08 in. long, with a line of gland-tipped hairs on the back. *Anthers* short, oblong, obtuse, ·06–·07 in. long. *Style* ·15 in. long; stigma punctiform. *Fruit* shortly turbinate, ·15 in. long and wide, densely muricate.

PERAK; Larut, in dense old jungle, 3200–3500 ft., *Kunstler* 2133! Maxwell's Hill, *Scortechini* 12!

26. SONERILA CAPITATA, Stapf and King. An ascending, unbranched or scantily branched herb, 3–12 in. high, rufously strigillose on the stem, the petioles and the nerves on the underside of the leaves, and also in the cymes, and with few or very few scattered, short hairs on the upperside of the leaves. *Stem* prostrate at the base, stout, succulent, swollen at the nodes, leafy part up to 7 in. long. *Leaves* very dissimilar,

the larger of a pair petioled, asymmetrical, obliquely obovate, elliptic or oblong, abruptly contracted into a narrow acumen, unequally cordate at the base with a small rounded lobe (to ·2 in. long) on the broader side and gradually narrowed on the inner side, entire, membranous, light-green, 4–6 in. by 1·75–3 in., 5–8-nerved from near the base, with 2–5 nerves in the broad, and 2 in the narrow half, with oblique, on both sides distinctly raised, transverse veins; petiole stout, ·5–1·5 in. long, small leaves orbicular-reniform, acute, cordate, sessile, up to ·4 in. in diam. *Cymes* terminal and axillary, long-peduncled, capitate, very dense, bracteate, few- to many-flowered; peduncles rather slender, glabrescent in the upper part, bracts numerous, linear, up to ·25 in. long; pedicels slender, ·07–·09 in. long. *Calyx* oblong, densely shaggy from short hairs, thickened below, ·07–·09 in., teeth narrow, triangular, ·04 in. long. *Petals* oblong, acuminate, white or pinkish, ·12 in. long, with a line of short, thick hairs on the back. *Anthers* short, oblong, obtuse, ·1 in. long. *Style* filiform, ·1 in. long, stigma punctiform. *Fruit* semiglobose, densely muricate, ·15 in. long and wide.

PERAK; *Scortechini* 1886! Gunong Batu Pateh, in dense jungle, 3000–4000 ft. *Kunstler* 8075! 4500 ft. *Wray* 222!

27. SONERILA CAESIA, Stapf and King. An ascending or creeping, low herb, densely hairy on the stem, petioles and the nerves and veins on the underside of the leaves, less so in the inflorescence and with few or no hairs on the upperside of the leaves, hairs rufous, fine, straight and adpressed, particularly on the nerves, or more or less spreading on the petioles, coarse on the rhachis of the cyme and at the base of the umbels. *Stem* rather stout, prostrate below, leafy-part rarely more than ·5 in. long. *Leaves* very dissimilar, the larger of a pair long-petioled, asymmetrical, obliquely elliptic, subacuminate or subobtuse, unequally cordate at the base with a large rounded lobe (·4–·6 in. long) on the outer, and a minute or quite obscure lobe on the inner side, entire or subentire, sometimes ciliate along the margin, somewhat fleshy, blue-green above, pale, green beneath with reddish nerves and veins, 3–5 in. by 1·75–2·75 in., 6–7-nerved from near the base, 3–4 nerves in the outer (larger), 2 nerves in the inner (narrow) half, with subhorizontal or oblique transverse veins; petiole 1–3·5 in. long; small leaves minute, ovate-cordate, shortly petioled, or suppressed. *Cymes* terminal and from the upper leaf-axils, usually 2–3 in peduncled umbels with small bracts at the base, bracteate, few- to very-many-flowered, very dense; common peduncle slender, 1–2·5 in. long; special peduncles ·25–1 in. long; pedicels slender, ·08–·1 long; bracts oblong, obtuse, as long as or shorter than the pedicels, glabrous, persistent. *Calyx* obconical-campanulate, ·12 in. long, scabrid, crimson; teeth triangular, acute, distinct. *Petals* oblong, cuspidate-acuminate, ·22 in. long, pale pink. *Anthers*

short, oblong, obtuse, ·1 in. long. *Style* ·25 in. long; stigma punctiform. *Fruit* semiglobose, ·15 in. long and wide, tubercled, tubercles rounded.

PERAK; Gunong Batu Pateh, 3,400 ft., *Wray* 1035! UPPER PERAK; 300 ft., *Wray* 3442! 3553!

28. SONERILA NIDULARIA, Stapf and King. An ascending, simple, rarely furcate herb, 3–8 in. high, densely rusty-tomentose on the stem, petioles and the nerves (rarely also between the nerves) on the underside of the leaves, pubescent in the inflorescence (including the calyx), otherwise glabrous; hairs fine, flexuous, short to very short and more or less adpressed or, in the upper part of the stem, sometimes longer and more or less spreading. *Stem* prostrate at the base, stout, straight or flexuous, rooting at the base, leafy part 1–5 in. long. *Leaves* very dissimilar, the larger of a pair shortly petioled, asymmetrical, obliquely oblong to obovate-oblong, subacuminate or subobtuse, unequally cordate at the base with a larger, rounded lobe (·12–·2 in. long) on the outer and a similar, but much smaller lobe on the inner side, entire, fleshy, rather firm, dark-green above, sometimes with a row of large white spots on each side of the midrib, 3–4·5 in. by 1–2 in., 5-nerved from near the base with oblique transverse veins, the outer nerve of the inner (narrow) side marginal and often indistinct; petiole stout, ·15–·6 in. long; small leaves sessile, reniform or orbicular, cordate, ·2 in. or less in diam. *Cymes* terminal and axillary, sessile, minutely or obscurely bracteate, few- to many-flowered, much contracted; pedicels very short at first, ultimately up to ·3 in. long, and stout. *Calyx* campanulate-oblong, ·12–·15 in. long; teeth triangular, acuminate, up to ·06 in. long. *Petals* obovate-elliptic, cuspidate, almost ·25 in. long. *Anthers* short, oblong, obtuse, ·14 in. long. *Style* ·25 in. long, stigma punctiform. *Fruit* shortly turbinate, subtrigonous, muricate, ·25 in. long and wide.

PERAK; *Scortechini* 650! Larut, 1000–2000 ft., *Kunstler* 2345! on hills in open jungle, *King's Coll.* 5764! Gunong Haram (?), *Scortechini* 655! Waterloo, common, *Curtis!*

29. SONERILA BRACHYANTHA, Stapf and King. An ascending simple or scantily branched herb, 3–8 in. high, softly hirsute or shaggy all over, hairs dense and more or less spreading on the stem, the petioles and all parts of the inflorescence (inclusive of the calyx), looser on both sides of the blades, reddish, rather long and flexuous. *Stem* rather stout, subflexuous, leafy part 1–3 in. long, branches, if any, spreading, resembling the main stem. *Leaves* very dissimilar, the larger of a pair petioled or subsessile, more or less asymmetrical, obliquely ovate-lanceolate to oblong-lanceolate, acuminate, unequally cordate at the base with a rounded lobe (·15–·25 in. long) on the outer and a minute lobe on the inner side, entire, membranous, dark brownish-green above, reddish or

deep-red or violet beneath, 2–4 in. by 1–1·5 in., 5-nerved from near the base, with 3 side-nerves in the broad and 2 side-nerves in the narrow half, uppermost side-nerves sometimes ·4–·5 in. above the base, with indistinct oblique transverse veins; petioles usually short or very short, rarely up to ·5 in. long; small leaves ovate-cordate, acute or reniform, ·15 in. long and broad, on slender, short petioles. *Cymes* terminal and axillary, solitary or in fascicles of 2–3, subsessile, indistinctly bracteate, few- to many-flowered, very dense; peduncles very short, slender, with 2 petioled small leaflets at the base; rhachis shaggy, bracts finely filiform, ciliate, hidden among the hairs of the rhachis; pedicels very slender, about ·1 in. long. *Calyx* campanulate-oblong, ·12–·15 in. long, shaggy; teeth triangular-lanceolate, ·07 in. long. *Petals* oblong, subacute, suberect, over ·25 in. long, pinkish white or pink, with a line of hairs on the back. *Anthers* short, oblong, obtuse, ·1 in. long. *Style* over ·25 in. long; stigma punctiform. *Fruit* semiglobose-turbinate, muricate, ·2 in. long and wide.

PERAK; *Scortechini* 1873! 1875! Goping, in dense jungle, *Kunstler* 434! 440! Larut, in dense jungle, 500–800 ft., *King's Collector* 5752! MALACCA; Kinta Gunong, 1000–1500 ft., on rocky places, *King's Collector* 7179! Gunong Inas, 5000 ft., *Wray* 4088.

30. SONERILA MICROCARPA, Stapf and King. An ascending herb, 3–6 in. high, rusty-tomentose on the stem, petioles and the underside of the leaves, more coarsely hairy in the inflorescence (including the calyces) from short, somewhat stiff and spreading, or soft and more adpressed (underside of the leaves) hairs, and besides with scattered, longer and stouter, flexuous hairs on the upper side of the leaves. *Stem* long, prostrate at the base, somewhat stout, straight or subflexuous, leafy part 2–4 in. long. *Leaves* very dissimilar, the larger of a pair shortly petioled, asymmetrical, obliquely obovate-lanceolate or oblanceolate, abruptly acuminate, unequally cordate at the base with a larger rounded lobe (·1-·2 in. long) on the outer, and a similar, but very minute or obscure lobe on the inner side, subentire or entire or obtusely serrulate, fleshy, rather firm, dark-green above, sometimes with numerous small white spots, 2·5–4 in. by 1–1·5 in., 4–5-nerved from near the base with oblique transverse veins, petiole ·15–·4 in. long; the small leaves sessile, reniform or orbicular, cordate, ·2 in diam. *Cymes* terminal and from the upper axils, subsessile or shortly peduncled, ebracteate, few- to many-flowered, rather lax; peduncle very slender, if any, up to ·5 in. long; pedicels filiform, up to ·25 in. long. *Calyx* campanulate-ovoid, ·12 in. by ·08 in.; teeth triangular. *Petals* oblong, acute, almost ·25 in. long, like the calyx pink. *Anthers* short, oblong, obtuse, ·08–·1 in. long. *Style* ·25 in. long; stigma punctiform. *Fruit* pale pink, subtrigonous, turbinate, minutely muricate, ·08–·11 in. long, ·15 in. broad.

PERAK; *Scortechini!* Upper Perak, 300 ft., *Wray* 3445! 3446! 3621!

31. SONERILA COSTULATA, Stapf and King. An ascending, unbranched herb, a few inches high, densely hirsute or tomentose on the stem, the petioles and more or less also in the inflorescence, including the calyx; adpressedly strigillose on the nerves and veins on the underside of the leaves, and with scattered, often very few, stouter hairs on the upper side of the leaves, hairs rufous, those of the stem, petioles and inflorescence flexuous, more or less spreading. *Stem* prostrate below, subflexuous, leafy part rarely more than 1 in. long. *Leaves* crowded, the larger of a pair petioled, more or less asymmetrical or the upper sometimes almost symmetrical, obliquely (if asymmetrical) obovate-oblong or oblong, subacuminate, unequally cordate at the base with a rounded lobe (·2 in. long) on the larger and a minute lobe on the narrower half, entire, ciliolate along the margin, membranous, dark green, 3–6 in. by 1·3–2·5 in., 6- or rarely 7-nerved from near the base with 3 (rarely 4) nerves in the broad and 2 in the narrow half, with oblique, conspicuously prominent, transverse veins on both sides; petiole stout, ·3–·5 in. long; small leaves ovate-cordate to reniform, minute or up to ·33 in. long, on short petioles. *Cymes* terminal and in the upper axils, solitary or 2 on a common very short peduncle, ebracteate, few- or many-flowered, contracted; rhachis very slender; peduncles very short; pedicels slender, ·08–·12 in. long. *Flowers* unknown. *Fruit* semiglobose-turbinate, muricate, ·15–·18 in. long and wide.

PERAK (?); foot of Gunong Panti, *Kunstler* 220!

Rather closely allied to *S. Beccariana*, Cogn.; but this has on the whole narrower, more acuminate leaves and much larger fruits.

32. SONERILA MACROPHYLLA, Stapf and King. An ascending simple herb, 3–5 in. high, softly hirsute or shaggy all over; hairs dense and more or less spreading on the stem, the petioles and all parts of the inflorescence (inclusive of the calyx), looser on both sides of the leaves, pale reddish, rather long and flexuous. *Stem* prostrate below. *Leaves* very dissimilar, the larger of a pair petioled, asymmetrical, obliquely elliptic, acuminate, unequally cordate at the base with a large, rounded lobe (·4 in. long) on the outer and a much smaller lober on the inner side, entire or subentire, membranous, on both sides light-brown when dry, 4–6 in. by 2·2–3 in., about 7-nerved from near the base, with 4 nerves in the broad, 2 in the narrow half and with usually indistinct, fine, oblique, transverse veins, uppermost side-nerve 1–1·25 in. above the base; petiole stout, ·5–1·2 in. long; small leaves ovate-cordate to reniform, up to ·25 in. long, on short, slender petioles. *Cymes* terminal and in the upper axils, solitary or 2 or a common short peduncle, ebracteate, rather many-flowered, apparently very dense owing to the long interwoven

hairs; rachis slender; common peduncle very short to ·7 in. long, slender, with a pair of spathulate-lanceolate, petioled leaflets at the point of branching; special peduncles very short; pedicels very slender, up to ·15 in. long. *Calyx* campanulate-oblong, about ·14 in. long, very shaggy; teeth triangular-lanceolate, up to ·06 in. long. *Petals* oblong, acute, suberect, ·3–·35 in. long; stigma punctiform. *Fruit* semiglobose-turbinate, muricate, about ·2 in. long and wide.

PERAK; *Scortechini!*

VAR. *laxipilosa*, Stapf and King. All parts loosely hairy with the hairs as in the type. *Leaves* up to 6 in. by 3·5 in., rather thinner. Common and special peduncles short or up to 3 in. long (together).

PERAK; Ipoh, Kinta, *Curtis* 3154! Pulau Butong, *Curtis*!

33. SONERILA PARADOXA, Naud. in Ann. Sc. Nat. Ser. 3, XV, 321. A low, creeping herb, softly hirsute or shaggy all over; hairs dense and more or less spreading on the stem, petioles and all parts of the inflorescence (including the calyx), looser on both sides of the blades, reddish, rather long and flexuous. *Stem* creeping, slender to rather stout, rooting, the leaf-bearing, terminal part rising rarely more than ·5 in. above the ground. *Leaves* crowded, very dissimilar, the larger of a pair petioled, asymmetrical, obliquely oblong or elliptic, shortly acuminate, unequally cordate at the base, with a large rounded lobe (·25–·5 in. long) on the outer and a similar but much smaller lobe on the inner side, entire or subentire, membranous, soft, light-green, 3–6 in. by 1·2–2·5 in., 6–8 nerved from near the base (3–5 nerves in the broader half), with oblique curved transverse veins; petiole ·4–2 in. long or the uppermost very short; small leaves rotundate-ovate or reniform, cordate, ·08–·4 in. in diam., on very slender petioles (·08–·6 in. long). *Cymes* terminal and from the upper axils, solitary with a pair of small petioled leaflets at the middle of the peduncle, or in umbels of 2–4, ebracteate or inconspicuously bracteate, few- to many-flowered, dense; common peduncle slender, usually 1–2 in. long; special peduncles much shorter; rhachis very shaggy; bracts linear to filiform, ciliate, short, usually hidden among the hairs of the rhachis or suppressed; pedicels ·08–·1 in. long, very slender. *Calyx* campanulate-oblong, about ·15 in. long, shaggy; teeth short, triangular. *Petals* oblong, acute, suberect, over ·25 in. long, white. *Anthers* oblong, obtuse, ·1 in. long. *Style* over ·3 in. long; stigma punctiform. *Fruit* semiglobose-turbinate, ·12–·15 in. long, ·18 in. wide, muricate-tuberculate. *S. moluccana*, Jack. Misc. I, 8; Wall. Cat. 4089; Benn. Pl. Jav. Rar. 215, (p.p.); Blume, Mus. I, 10 (p.p.); Miq. Fl. Ind. Bat. I, 562 (p.p.); C. B. Clarke in Hook. f. Fl. Brit. Ind. II, 537 (p.p.); Triana in Trans. Linn. Soc. XXVIII, 77; Cogn. in DC. Monogr. VII, 508 (p.p.); Stapf in Ann. Bot. VI, 311, 312 (p.p.); and Roxb. Flor. Ind. I, 178?

PENANG; *Wallich* Cat. 4089! *Griffith* 2298! *Maingay* 780 (Kew Distrib.) in shady, damp places, 1500–3000 ft., *Stoliczka*, *Hullet* 196! *King's Coll.* 1284! Pulloh Bahang, *Curtis* 411! SINGAPORE (?); *Lobb* 325!

Roxburgh says of his *S. moluccana*, "Habitat in insulis Moluccanis." His description is extremely short and insufficient, and there does not seem to have been a specimen in his herbarium nor was it figured by him. It is very improbable that the plant he described was identical with the Penang plant, if he received it really from the Moluccas, as the distribution of most species of the section *Hexadon* is very local, and no specimens, referrable to *S. paradoxa*, have been discovered, so far, east of the Malay Peninsula. On the other hand, it is possible that Roxburgh meant *S. malaccana* instead of "*S. moluccana*" and *insulis malaccanis* for "*ins. moluccanis*," as the editors of his Flora Indica put it. There is at least nothing in his description which would contradict the assumption that his brief diagnosis was drawn up from the Penang plant. In view of this uncertainty we have preferred to follow Naudin and to consider Roxburgh's *S. moluccana* as a "species dubia" and adopt Naudin's name for the Penang plant.

34. **SONERILA BEGONIAEFOLIA**, Blume in Flora (1831), 490. An ascending, usually unbranched herb, 2–6 in. high, moderately hairy with the exception of the often glabrous upper side of the leaves; hairs of the stem, petioles and the inflorescence rufous, flexuous, more or less spreading, of the leaves confined to the nerves and veins of the underside, often scanty, very short. *Stem* rather slender, rooting below. *Leaves* very dissimilar, the larger of each pair petioled, more or less asymmetrical, obliquely elliptic, subacuminate, unequally cordate at the base with a rounded lobe (·2–·3 in. long) on the outer and a much smaller on the inner side, entire or more or less obtusely serrulate, ciliolate, membranous, dark-green above, pale brown (when dry) beneath, 3–4 in. by 1·7–2·3 in., 6- sub-7-nerved from near the base (with 3–4 nerves in the broader half), with usually very conspicuous subhorizontal transverse veins; petiole ·4–1·2 in. long; small leaves ovate to rotundate, acute, cordate, very small, distinctly petioled. *Cymes* terminal and axillary, peduncled, dense, at length up to ·8 in. long, deciduously bracteate; peduncle slender, up to 1·5 in. long; bracts linear-oblong, ciliolate, up to ·1 in. long, deciduous; pedicels ·07–·1 in. long. *Calyx* campanulate-oblong, teeth broad, triangular. *Petals* ovate, acute. *Anthers* short, oblong, obtuse. *Fruit* shortly turbinate, ·18–·22 in. long and wide, muricate-tuberculate, tubercles rather coarse, acute, mostly passing into short fine bristles. Korth. in Verh. Nat. Gesch. Bot. 248, t. 54; Naudin in Ann. Sc. Nat. Ser. 3, XV, 322; Triana in Trans. Linn. Soc. XXVIII, (1873), 77. *S. moluccana*, Benn. Pl. Jav., Rar. 215; Miq. Fl. Ind. Bat. I, 562; C. B. Clarke in Fl. Brit. Ind. I, 562; Cogn. in DC. Monogr. VII, 508; Stapf in Ann. Bot. VI, 312 (all references under *S. moluccana*, p.p.).

SINGAPORE; Bukit Tunat, *Ridley* 2005! Chanchukang, *Ridley* 422! Bukit Mandu, *Ridley* 2005/*a*! JOHORE; Gunong Panti, *Ridley* 4199! DISTRIB. Sumatra, Java, South Borneo.

There being no flowers with the specimens enumerated, they have been described from Korthals, l.c. The Sumatra specimens have leaves which are more or less hairy or bristly on the upper side and represent Blume's VAR. *pilosiuscula* of *S. begoniaefolia* (Blume, Mus. I. 11) or *S. moluccana* VAR. *pilosiuscula* Stapf, l.c. A specimen from South Borneo, collected by Motley, is almost glabrous on the upperside of the leaves.

35. SONERILA GLABRIFLORA, Stapf and King. A creeping or ascending herb, a few inches high, with a long creeping rhizome, hairy on the stem, peduncles, petioles and the nerves on the underside of the leaves, otherwise glabrous; hairs reddish, straight, adpressed. *Stem* rather stout, slightly swollen at the nodes, frequently rooting, leafy part 1–4 in. long. *Leaves* very dissimilar, the larger of each pair petioled, asymmetric, obliquely elliptic, obtuse or subacute, unequally cordate at the base with a large, rounded lobe on the outer and small or obscure one on the inner side, entire or obscurely and remotely toothed, fleshy, soft, dark glossy-green above, pale with purple nerves beneath, 3–6 in. by 2–3·5 in., with 3–5 lateral nerves in the outer and 2–3 in the inner half near the base and with rather lax subhorizontal transverse veins; petiole rather stout, 1–2·5 in. long, the small leaves sessile, reniform-cordate, ·2–·25 in. in diam. *Cymes* terminal and axillary, usually 2- or 3-nate on a common peduncle, ebracteate, many-flowered, rather dense, glabrous, when ripe up to 1·3 in. long, common peduncle 1–2 in., special peduncles ·5–1·2 in. long, slender; pedicels very slender, ·1–·12 in. long. *Calyx* campanulate-ovoid, ·12–·15 in. by ·06 in.; teeth very broad and short. *Petals* elliptic, acute, almost ·25 in. long, white or tinged with pink. *Anthers* linear-oblong, obtuse, ·12 in. long. *Style* ·15 in. long; stigma punctiform. *Fruit* subtrigonous, hemispherical, quite smooth, ·15–·16 in. long and wide; valves in the depressed centre of the capsule 6, delicately membranous, fragile.

PERAK; Larut, in wet jungles, up to 100 ft., *Kunstler* 1955! 2128!

36. SONERILA ELATOSTEMOIDES, Stapf and King. An erect, ascending or creeping, unbranched or scantily branched herb, up to 6 in. high, softly tomentose in all parts, hairs rusty coloured, short, spreading and very dense on the stem and petioles, somewhat laxer in the inflorescence inclusive of the calyx, pale and longer on the leaves. *Stem* slender, subflexuous. *Leaves* very dissimilar, the larger of each pair petioled, asymmetrical, obliquely oblong-elliptic or obovate, acuminate, unequally cordate at the base with the outer lobe broad, rounded, up to ·2 in. long and the inner similar but much smaller, entire, membranous, green

above, whitish green below, 2·2–2·8 in. by 1–1·2 in., 6–7-nerved from near the base (with 3–4 lateral nerves in the broad and 2 in the narrow half) with oblique transverse veins, nerves and veins not very distinct; petiole ·18–·4 in. long; small leaves reniform-cordate, subsessile, ·15 in. in diam. *Cymes* terminal and axillary, long peduncled, few-flowered, not very dense, ebracteate; peduncle slender, ·6–1 in. long; pedicels slender, ·02 in. long. *Calyx* oblong-campanulate, ·08 in. long, teeth short. *Petals* oblong, acute, ·18 in. long, with a line of hairs on the back. *Anthers* short, oblong, obtuse, ·09 in. long. *Style* ·2 in. long; stigma punctiform. *Fruit* semiglobose, muricate, ·12 in. long and wide.

PERAK; Gunong Bubu, *Wray* 3825!

37. SONERILA BICOLOR, Stapf and King. An ascending or suberect, nearly always unbranched herb, 3–9 in. high, softly hairy all over, hairs pale, straight, fine, spreading except on the upper side of the leaves, very dense in the upper part of the stem, on the petioles and in the inflorescence inclusive of the calyx. *Stem* rather slender, subflexuous, slightly swollen at the nodes. *Leaves* very dissimilar, the larger of each pair more or less asymmetrical, shortly petioled, obliquely oblong to lanceolate-oblong, distinctly acuminate, unequally cordate at the base with a rounded lobe (to ·4 in. long) on the outer, and a minute or obscure lobe on the inner side, ciliate along the margin, membranous, soft, dark green or magenta-red above with a light green band along the midrib, purple beneath, 3–6 in. by 1–1·5 in., finely 5-nerved from near the base (uppermost nerve from ·4–·6 in. above the base, with faint oblique transverse veins; petiole ·2–·6 in. long; small leaves ovate to rotundate, cordate, shortly petioled, very small to ·4 in. long. *Cymes* terminal and axillary, peduncled, loosely few- to 10-flowered, ebracteate; peduncle slender, ·4–1·2 in. long; pedicels ·1–·2 in. long, slender, also when mature. *Calyx* oblong-subcampanulate, ·12 in. long; teeth triangular, short. *Petals* elliptic-oblong, acute, ·35 in. long, pink. *Anthers* linear-oblong, subobtuse, ·12 in. long. *Style* ·35 in. long; stigma punctiform. *Fruit* semiglobose, ·12–·15 in. long and wide, muricate, opening with 6 thinly membranous teeth in the depressed centre or with 3, 2-toothed valves.

PERAK; Ulu Salama, 500 ft., *Wray* 4159! Larut, in dense jungle, 500–800 ft., *King's Coll.* 5794! Tapa, *Baldwin*!

38. SONERILA CALYCULA, Stapf and King. An ascending or creeping herb, about 6 in. long, rusty tomentose on the stem, petioles and peduncles, and pubescent on the nerves on the underside of the leaves, otherwise glabrous; hairs short, curled or flexuous, loosely adpressed. *Stem* rather stout, straight, rooting in the lower part, leafy part about 4 in.

long. *Leaves* very dissimilar, the larger of each pair petioled, symmetrical, or almost so, lanceolate, gradually tapering towards both ends, entire, somewhat fleshy, pale-brown on both sides when dry, 3·5–5·5 in. by ·8–1·25 in., 5-nerved from the base (the outer nerves faint, submarginal) with faint oblique transverse veins; petiole ·35–·4 in. long; small leaves reniform, cordate, very minute, ·05 in. in diam., or suppressed. *Cymes* terminal and from the upper axils, peduncled, few-flowered; peduncle filiform, ·4–·5 in. long; pedicels fine, not spongy when mature, ·1–·12 in. long. *Flower* unknown. *Fruit* semiglobose, smooth, ·08–·1 in. by ·12 in., crowned by the ultimately deciduous calyx-margin the teeth of which are very broadly triangular and cuspidate.

PAHANG; Tahan River, *Ridley* 2237!

9. PHYLLAGATHIS, Blume.

Herbaceous small shrubs with very short stems. *Leaves* opposite (or the terminal leaf solitary), large, petioled, orbicular, or sub-orbicular, 7–9-nerved. *Flowers* in a peduncled dense head, purple. *Calyx-tube* campanulate, glabrous or with long bristles near the top, teeth 4 (rarely 3), acute, long-setose. *Petals* 4 (rarely 3), ovate, acute, glabrous. *Stamens* 8 (rarely 6), equal; anthers elongate, scarcely produced at the base, connective without appendage. *Ovary* adnate to the bottom of the calyx-tube, 4- (rarely 3-) celled, glabrous at the apex; style filiform; ovules very numerous, placentas large axile. *Capsule* broadly funnel-shaped, opening by 4 valves at the top. *Seeds* ellipsoid, somewhat obovoid, with glandular, hardly raised dots; raphe slightly excurrent along one side of the seed its whole length.—DISTRIB. Species 5; all Malayan.

Leaves oblanceolate ... ... 1. *P. tuberculata.*
Leaves more or less orbicular; peduncles of inflorescence many inches long and as long as or longer than the long petioles:—
Flowers in narrow, shortly branched panicles ... 2. *P. Griffithii.*
Flowers in terminal solitary ebracteate umbels:—
Peduncles glabrous ... ... 3. *P. Scortechinii.*
Peduncles hispid ... ... 4. *P. hispida.*
Flowers in bracteate umbels with peduncles 1 or 2 inches long ... ... 5. *P. rotundifolia.*

1. PHYLLAGATHIS TUBERCULATA, King, n. sp. *Stem* short, woody, erect, covered with small warts. *Leaves* two or three, membranous, oblanceolate, shortly acuminate, very gradually narrowed to the short hispid petiole, 7- to 9-nerved; upper surface glabrous except for a few

scattered stout bristles; lower surface coarsely strigose on the nerves, otherwise glabrous, the reticulations fine; length 10 to 16 in., breadth 3 to 6 in., petiole 0 to 1·5 in. *Peduncles* much shorter than the leaves, solitary or several from one axil, sparsely glandular-hairy, bearing at their apices a solitary, lax, involucrate, compound umbel; involucres oblong, obtuse, glabrous, ·5 in. in length or shorter, those of the umbellules smaller; pedicels shorter than the calyx-tube. *Flowers* nearly ·75 in. long. *Calyx-tube* rather widely cylindric, bearing (especially towards its base) numerous flat, shortly stalked, fleshy discoid glands; the teeth 4, short, shallow, wide, each crowned by a stalked gland. *Petals* longer than the calyx, oblong, much acuminate (forming a narrow cone in bud). *Stamens* 8; the filaments about one-fourth as long as the linear acuminate anthers. *Ovary* short, broad, truncate, deeply grooved and almost winged; style long, flattened, smooth. *Capsule* ·3 in. in diam.

PERAK; *Scortechini* 1872. *King's Collector* 7233.

At once recognisable by the curiously glandular calyx.

2. PHYLLAGATHIS GRIFFITHII, King. A shrub with a very short stem and usually only a single pair of unequal leaves. *Leaves* coriaceous, sub-rotund, 7-nerved, apex obtuse, the base cordate, edges quite entire; both surfaces glabrous, the lower lepidote and slightly puberulous on the nerves; length 5 to 8 in., breadth 3·5 to 6·5 in., petiole 4 to 8 in. *Panicle* axillary, nearly as long as the leaves, bearing in its upper half a few very short few-flowered branches, the whole lepidote especially towards the apex. *Flowers* corymbose, on scaberulous pedicels, as long as the narrowly campanulate glandular-hairy calyx-tube: mouth of calyx truncate, slightly expanded, and minutely 4-toothed. *Petals* 4, quadrate. *Stamens* much exserted: *anthers* not so long as the glabrous filaments, narrow acuminate, much sagittate at the base, inappendiculate. *Allomorphia Griffithii*, Hook. MSS. Fl. Br. Ind. II, 527. Triana in Trans. Linn. Soc. XXVIII, 74, t. VI, fig. 66c; Cogn. in DC. Mon. Phan. VII, 467.

MALACCA: *Griffith* (K.D.) 2264/1. *Maingay* (K.D.) 775; *Hullett*. PERAK; *Scortechini* 170; *King's Collector* 694. SELANGORE; *Curtis* 2333! *Ridley* 7317. PENANG; *Stolickza.*

I have removed this from *Allomorphia* to *Phyllagathis* of which it has the flowers and habit.

3. PHYLLAGATHIS SCORTECHINII, King, n. sp. *Stem* woody below, shortly creeping above and subterete. *Leaves* on very long petioles, coriaceous, reniform-rotund, cordate, the apex minutely apiculate, stoutly 9-nerved; the transverse veins bold, glabrous on the upper surface, glandular-puberulous on the lower; length 5 to 10 in.; breadth

5 to 9 in.; petiole 4 to 9 in., stout. *Peduncles* solitary, longer and more slender than the petioles, bearing at the apex a single dense, ebracteate umbel. *Flowers* nearly ·5 in. long to the apices of the stamens, their pedicels ·25 in. long. *Calyx-tube* narrowly campanulate, not ribbed, glabrous, very minutely lepidote; the teeth 4, broad, rounded, shallow. *Petals* rotund-ovate, blunt, short. *Stamens* 8; the filaments about half as long as the linear acute anthers. *Ovary* grooved, short, broad; style as long as the anthers, cylindric, glabrous. *Capsule* about ·2 in. in diam., truncate, the valves broad, truncate.

PERAK; *Scortechini* 269; *King's Collector* 4287. SELANGORE; *Ridley* 7317.

This species is closely allied to *P. Griffithii* but differs notably in its solitary terminal umbels.

4. PHYLLAGATHIS HISPIDA, King, n. sp. *Stem* very short, woody, hispid. *Leaves* 2 or 3, sub-coriaceous, on long petioles, broadly ovate, cordate at the base, the apex abruptly and shortly acuminate, the edges with minute, sharp, sometimes unequal teeth, 7- to 11-nerved, the transverse nerves strong: upper surface glabrous, the lower uniformly covered with minute, scurfy pubescence, the main nerves with a few long, spreading, stout bristles; petiole densely shaggy near the base, more sparsely hispid upwards: length 5 to 10 in., breadth 3 to 7 in.; petioles varying from 4 to 12 in. *Peduncle* axillary, shorter than the leaves and more slender than the petioles, sparsely hispid; the umbel few-flowered, ebracteate. *Flowers* ·75 in. long; their pedicels slender, hispid, longer than the calyx. *Calyx-tube* narrowly cylindric or cylindric-campanulate, nearly glabrous, or sparsely hispid; the mouth with 4 broad, shallow, blunt teeth. *Petals* broadly ovate, acute. *Stamens* 8; *anthers* not much longer than the filaments, broadly lobed and cordate at the base, and the connective with a short, narrowly cylindric basal protuberance behind. *Ovary* very short; *style* filiform. *Capsule* ·2 in. across.

PERAK; *Scortechini! Wray* 1021, 1602, 3519. PAHANG; *Ridley* 2236.

5. PHYLLAGATHIS ROTUNDIFOLIA, Blume in Flora, 1831, 507. *Stem* creeping, obtusely 4-angled. *Leaves* unequal in the pairs, rotund or rotund-ovate and shortly apiculate; both surfaces, but especially the lower, minutely lepidote; main nerves 7 to 9, curved, radiating from the base, the transverse nerves bold, curved; petioles unequal, from ·85 to 3·5 in. long, their interior surfaces covered with coarse black bristles; length 2 to 8 in.; breadth 1·5 to 6 in. *Inflorescence* 4- to 30-flowered; the involucres orbicular-ovate acuminate. *Calyx-tube* ribbed, minutely lepidote; the teeth triangular, broad at the base but with

elongate narrow apices bearing 2 or 3 bristles; filaments from one-fourth to one-half of the length of the linear stamens. *Ovary* 4-angled, the apex with a truncate cartilaginous rim. Korth. in Verh. Nat. Gesch. Bot. 252, t. 57; Naud. in Ann. Sc. Nat. Ser. 3, XXV, 332; Bot. Mag. t. 5282; Miq. Fl. Ind. Bat. I, 559; Triana Melast., tab. VI, fig. 73; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 541; Cogn. in DC. Mon. Phan. VII, 518. *Melastoma rotundifolia*, Jack in Trans. Linn. Soc. XIV, 11; DC. Prodr. III, 149.

MALACCA; *Griffith, Maingay.* SELANGORE; *Ridley* 7327. PERAK; *Scortechini, King's Collector, Wray.* DISTRIB. Burma, Sumatra, Java; common.

Rather variable as to size of leaves and as to the number of bristles on their petioles. The teeth of the calyx also vary as to the length of the acuminate apex and as to the number of bristles.

10. MARUMIA, Blume.

Twining shrubs; branches cylindric, thickened at the nodes. *Leaves* opposite, short-petioled, coriaceous, cordate at the base, 3-nerved from the base besides two submarginal nerves, entire, stellate-tomentose beneath. *Cymes* axillary; flowers 3–5, large, pedicelled, purple or white. *Calyx-tube* narrowly campanulate, tomentose (and often bristly or stellate-hairy); lobes 4, deep, persistent. *Petals* 4, obovate. *Stamens* 8, unequal; anthers elongate, opening by a single pore; connective of the longer anthers carrying in front two long bristles and behind often one or two spurs or several twisted bristles. *Ovary* at the base (or half its height) adnate to the calyx, 4-celled, densely hairy at the apex; style filiform; ovules numerous, placentas axile. *Berry* ellipsoid, crowned by the calyx-limb. *Seeds* numerous, oblong-ellipsoid, with glandular scarcely raised dots, raphe slightly excurrent along the whole length of one side.—DISTRIB. Species 10, Malaya, Borneo and the Philippines.

Calyx-tube without bristles ... . 1. *M. nemorosa.*
Calyx-tube very bristly :—
  Teeth of limb of calyx half as long as the tube, oblong, acute: upper surface of leaves not reticulate ... ... 2. *M. rhodocarpa.*
  Teeth of limb of calyx one-fourth as long as the tube or less, broadly triangular, blunt; upper surface of leaves much reticulate ... ... 3. *M. reticulata.*

1. MARUMIA NEMOROSA, Blume in Flora XIV, (1831), 505. A straggling climber; all parts except the upper surfaces of the leaves, the petals, stamens and ovaries covered with dense rufous or pale stellate

tomentum, without bristles; the branches thickened and annulate at the nodes. *Leaves* sub-coriaceous, elliptic or oblong-lanceolate, slightly cordate at the base, the apex shortly acuminate or acute, 5-nerved (the lateral pair of nerves faint); upper surface glabrous; length 3 to 6 in.; breadth 1·35 to 2·75 in.; petiole ·2 to ·4 in. long. *Flowers* about 1·75 in. long (including the stamens), solitary or in pedunculate cymes of three from the axils of the leaves. *Calyx-tube* more or less narrowly campanulate, somewhat constricted below the limb; limb with 4 deep, triangular teeth. *Petals* broadly ovate, blunt, longer than the calyx-tube, rose-coloured. *Stamens* 8, unequal; the anthers of all linear, curved; the longer with two narrow, curved filaments at the base in front, and several smaller behind; the four smaller with two smaller, equal filaments at the base in front only. *Fruit* succulent, oblong-ovoid, constricted below the permanent calyx-teeth, sometimes sub-tuberculate and always stellate-tomentose, about 1 in. long. Blume Mus. Bot. I, 33; Naud. in Ann. Sc. Nat. Ser. 3, XV, 279; Miq. Fl. Ind. Bat. I, pt. I, 533; Triana in Trans. Linn. Soc. XXVIII, 82; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 542; Cogn. in DC. Mon. Phan. VII, 549. *M. affinis,* Korth. in Verh. Nat. Gesch. Bot. 241, t. 60; Miq. l.c. 533. *Melastoma nemorosum,* Jack in Trans. Linn. Soc. XIV, 8; DC. Prodr. III, 149; Wall. Cat. 4043.

In all the provinces except the Nicobar and Andaman Islands. DISTRIB. Sumatra, Borneo.

2. MARUMIA RHODOCARPA, Cogn. in DC. Mon. Phan. VII, 550. A powerful climber; young branches, petioles, lower surfaces of leaves and calyx densely clothed with minute, pale, stellate tomentum intermixed with numerous stout, spreading, brown bristles, the nodes somewhat swollen and with transverse lines. *Leaves* sub-coriaceous, oblong, narrowed to the rounded, minutely cordate base, the apex shortly acuminate, 5-nerved (the lateral pair slender); upper surface glabrous; length 3·5 to 5 in.; breadth 1 to 2 in.; petiole ·15 to ·2 in. *Flowers* (including the stamens) nearly 1·5 in. long, in axillary, pedunculate cymes of three. *Calyx-tube* longer than the glabrous pedicel, narrowly campanulate, constricted below the limb; limb with 4 oblong, acute teeth half as long as the tube and like the latter bearing many long, curved bristles. *Petals* white, obovate. *Stamens* 8, unequal, all linear and acuminate: the four larger with two long, filiform appendages in front and several smaller behind: the four smaller with about 4 to 6 appendages. *Fruit* shortly ovoid, crowned by the large calyx-teeth, bristly, ·4 in. in diam. *Melastoma rhodocarpum,* Wall. Cat., 4045. *Marumia echinata,* Naud. Ann. Sc. Nat. Ser. 3, XV, 280; Miq. Fl. Ind. Bat. I, pt. I, 534. *M. zeylanica,* Triana

(not of Blume) in Linn. Trans. XXVIII, 82, tab. VII, fig. 88*b*; C. B. Clarke in Fl. Br. Ind. II, 542.

Singapore; *Wallich; Anderson* 68, 69; *Hullett* 125; *Ridley* 258; *King's Collector* 278. Malacca; *Maingay* (K.D.) 785; *Cuming; Griffith* (K.D.) 2270.

Var. *sub-glabrata*, Cogn. l.c. 550. Leaves glabrous beneath except the nerves. *M. zeylanica*, C. B. Clarke (not of Blume), var. *sub-glabrata*, Hook. fil. Fl. Br. Ind. II, 542.

Singapore; *Anderson* 64.

3. Marumia reticulata, Blume Mus. Bot. I, 34. Scandent; young branches, petioles, under surfaces of leaves and calyx densely clothed with rusty stellate, more or less deciduous hairs, the young branches, petioles and especially the calyx with stout spreading bristles intermixed; the nodes swollen and annulate. *Leaves* subcoriaceous, ovate-lanceolate, 5-nerved (the lateral pair slender), minutely cordate at the base, the apex shortly acuminate; upper surface deeply reticulate, glabrous; length 2 to 3·5 in., breadth ·8 to 1·5 in., petiole ·1 to ·2 in. *Flowers* 1·25 in. long (including the anthers), axillary, either solitary on pedicels as long as themselves or in pedunculate cymes of three; the middle flower being nearly sessile, the lateral pair on short pedicels. *Calyx-tube* densely hispid externally, the teeth 4, short, broadly triangular and blunt, tomentose on the inner surface. *Petals* ovate, sub-acute, glabrous. *Stamens* 8, the anthers somewhat unequal in length but all linear, curved and with two long appendages at the base in front. *Fruit* ovoid, (unripe) ·5 in. in diam., crowned by the calyx-teeth. Miq. Fl. Ind. Bat. I, pt. I, p. 535; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 542; Cogn. in DC. Mon. Phan. VII, 551. *M. stellulata*, Korth. (not of Blume) Ver. Nat. Gesch. Bot. 243. *M. oligantha*, Naud. in Ann. Sc. Nat. Ser. 3, XV, 281; Miq. l.c. 534.

Malacca; *Griffith* (K.D.) 2269; *Maingay* 784. Distrib. Sumatra, Java.

11. Dissochæta, Blume.

Shrubs, usually twiners. *Leaves* opposite, petioled or nearly sessile, elliptic or oblong-lanceolate, rounded at the base, 5-nerved from the base (the two submarginal nerves slender), entire. *Flowers* in terminal, sometimes leafy panicles, purple or white, bracts large or small. *Calyx-tube* campanulate-cylindric or funnel-shaped, densely stellate-tomentose, pubescent or glabrous; limb obscurely 4-lobed or entirely truncate, more rarely distinctly 4-toothed, persistent. *Petals* 4. *Stamens* 8, unequal, 4 shorter sometimes wanting, connective of the 4 longer with 2 long bristles in front at the base. *Ovary* adnate to the calyx, 4-celled, apex glabrous or densely hairy; style filiform; ovules very many, placentas axile. *Berry* ovoid or elliptic, crowned by the calyx-limb. *Seeds* elipsoid, flattened on the side of the raphe.—DISTRIB. Species 25; throughout Malaya to the Philippines.

Stamens 8 (four of them sometimes imperfect) :—
Young branches, under surfaces of leaves and panicles covered with persistent stellate-tomentum :—
The stellate-tomentum not mixed with bristles; the nodes with transverse interpetioler lines :—
Flowers 1·75 in. long ... ... 1. *D. annulata.*
Flowers ·75 in. long ... ... 2. *D. punctulata.*
The stellate-tomentum mixed with spreading persistent bristles; flowers ·75 in. long ... 3. *D. hirsuta.*
Young branches, under surfaces of leaves and panicles covered at first with stellate-tomentum which ultimately more or less disappears :—
Bracts of panicle obovate, persistent ... ... 4. *D. bracteata.*
Bracts of panicle linear, deciduous ... ... 5. *D. pallida.*
Young branches, under surfaces of leaves and panicles covered with minute simple scales not stellate ... 6. *D. gracilis.*
Stamens 4 :—
Panicles ebracteate, or bracts, if any, caducous :—
Flowers ·3 in. long; fruit ·15 to ·2 in. in diam.; mouth of calyx-tube 4-toothed; petals broadly oblong, blunt; stamens blunt, not appendiculate at the apex ... ... 7. *D. celebica.*
Flowers ·5 in. long; fruit ·2 to ·25 in. in diam.; mouth of calyx-tube truncate not toothed: petals ovate, acute; stamens narrowed to the appendiculate apex ... ... 8. *D. intermedia.*
Panicles with persistent, oblong bracts :—
Young branches at first rusty stellate-hairy, finally glabrous; branches of panicle divaricating, lax ... ... 9. *D. anomala.*
Young branches with persistent, pale, adpressed, stellate hairs; branches of panicle short, condensed ... ... 10. *D. Scortechinii.*

1. DISSOCHÆTA ANNULATA, Hook. fil. ex Triana in Trans. Linn. Soc. XXVIII, 83. A strong climber; young branches, petioles, under surfaces of leaves and inflorescence covered with dense, rusty, deciduous stellate tomentum, the nodes thickened and slightly annulate. *Leaves* coriaceous, ovate-oblong, cordate at the base, the apices shortly and rather abruptly acuminate, upper surface at first sparsely stellate-hairy, ultimately glabrous, the nerves and reticulations bold; length 2·5 to 3·5 in.; breadth 1 to 1·8 in.; petiole ·2 to ·5 in. *Panicle* solitary terminal, much longer than the leaves, lax, the branches divaricating,

cymose, 1- to 3-flowered; bracts small, caducous. *Flowers* 1·5 in. long (including the stamens), pedicels much shorter than themselves. *Calyx-tube* narrowly campanulate or funnel-shaped, the mouth widened and with 4 blunt, triangular teeth, densely stellate-hairy outside. *Petals* obovate-oblong, blunt, reflexed. *Stamens* 8; curved, elongate-linear, acuminate, with two bristle-like appendages at the base in front, laciniate behind. *Fruit* ellipsoid, succulent, crowned by the enlarged teeth of the calyx-tube. C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 543; Cogn. in DC. Mon. Phan. VII, 557. *Melastoma bracteatum*, Wall. Cat. 4044 (in part).

PENANG; *Wallich* 4044; *Griffith* (K.D.) 2268; *Maingay* (K.D.) 788; *Curtis* 740. MALACCA; *Wallich.* SINGAPORE; *Hullet* 213; *Ridley* 5187. JOHORE; *King's Collector* 224. PERAK; *Scortechini* 235. DISTRIB. Borneo.

2. DISSOCHÆTA PUNCTULATA, Hook. fil. ex Triana in Linn. Trans. XXVIII, 83. Young branches thickened but not annulate, clothed like the petioles, under surfaces of the leaves and the inflorescence with minute, rusty scales. *Leaves* coriaceous, oblong-ovate, the base rounded and not cordate, the apex acute or very shortly acuminate; 5-nerved, the marginal nerves very slender; upper surface glabrous; length 3 to 4·5 in.; breadth ·75 to 1·75 in.; petiole ·25 to ·4 in. *Panicles* solitary, terminal, several times longer than the leaves, the branches and branchlets short and the latter cymosely few-flowered, bracts small, linear, deciduous. *Flowers* ·75 in. long (including the stamens), on pedicels shorter than themselves. *Calyx-tube* infundibuliform, the mouth with a broad, everted, wavy, obscurely toothed edge, deciduously scaly. *Petals* 4, ovate, sub-acute, glabrous. *Anthers* 8, equal, curved, cylindric, attenuated to the 1-pored apex, the base with two long, geniculate, upward-curving, narrow, flattish appendages. *Fruit* succulent, urceolate, slightly warted, sub-glabrous, crowned by the slightly enlarged mouth of the calyx, ·4 in. long. C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 543; Cogn. in DC. Mon. Phan. VII, 555.

MALACCA; *Griffith* (K.D.) 2291! *Maingay* 789. SINGAPORE; *Ridley* 3918, 4803. SELANGORE; *Ridley* 2015. JOHORE; *Ridley* 3246, 2106. PENANG; *Walker, etc.*

3. DISSOCHÆTA HIRSUTA, Hook. fil. ex Triana Trans. Linn. Soc. XXVIII, 83. A strong creeper with slender branches only slightly thickened at the nodes; all parts except the upper surfaces of the leaves and the petals densely clothed with deciduous, stellate hairs mixed with long, stiff, spreading, curved hairs. *Leaves* membranous, lanceolate or ovate-lanceolate, 5-nerved (the lateral pair slender), the base rounded and slightly cordate, the apex shortly acuminate; upper surface

glabrous, length 3 to 4·5 in.; breadth 1 to 1·75 in.; petiole ·15 to ·3 in. *Panicle* solitary, terminal, thickened at the nodes, broadly pyramidal, much branched. *Flowers* ·75 in. long. *Calyx-tube* longer than the pedicel, cylindric-tubular, the mouth not everted but with four linear elongate teeth. *Petals* 4, broadly lanceolate, blunt. *Stamens* 8, equal, all perfect, elongate and narrow, the apices much prolonged into a rather thin appendage, the base with two delicate, filiform appendages. *Fruit* ovoid-globose, crowned by the persistent calyx-limb, densely setose-lepidote, ·4 in. in diam. Cogn. in DC. Mon. Phan. VII, 556.

JOHORE; at the base of Gunong Panti; *King's Collector* 197; *Ridley* 4185. DISTRIB. Borneo.

4. DISSOCHÆTA BRACTEATA, Blume in Flora, 1831, 495. Young branches with a transverse ridge at the nodes, petioles and panicles more or less densely clothed with sub-deciduous, rusty, stellate hairs, and the under surfaces of the leaves sparsely so. *Leaves* membranous, 5-nerved (the marginal pair faint), ovate-lanceolate, the base rounded and often sub-cordate, the apex acute or shortly acuminate; upper surface glabrous, the lower sparsely stellate-hairy; length 3 to 4·5 in.; breadth 1·25 in.; petiole ·2 to ·3 in. *Panicles* much bracteate, both axillary and terminal, the former shorter, the latter longer, than the leaves; the branches few, divaricate. *Flowers* 1·2 in. long (including the stamens), in cymes at the ends of the branchlets, each subtended by, and while in bud enveloped in, a membranous, obovate, blunt, stellate-pubescent, more or less permanent bract about ·5 in. long. *Calyx-tube* twice as long as the pedicels, cylindric-campanulate, the mouth slightly widened and minutely 4-toothed. *Petals* broadly elliptic, blunt, glabrous. *Stamens* 8, much curved, long, linear, the base with two long flattened, linear, upward-pointing appendages. *Fruit* ellipsoid, crowned by the rim of the calyx-tube, ·6 in. long. Miq. Fl. Ind. Bat. I, pt. I, 529; Triana in Trans. Linn. Soc. XXVIII, 84; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 543; Cogn. in DC. Mon. Phan. VII, 598. *D. bracteosa*, Naud. in. Ann. Sc. Nat. Ser. 3, XV, 76; Miq. Fl. Ind. Bat. I, pt. I, 527. *Melastoma bracteatum*, Jack in Trans. Linn. Soc. XIV, 9; Wall. Cat. 4044, partly.

PENANG; *Wallich*, Cat. 4044; *Curtis* 2298. MALACCA; *Maingay* 791. DISTRIB. Borneo, *Haviland*.

5. DISSOCHÆTA PALLIDA, Blume in Flora, 1831, 500. A shrubby creeper, 20 to 50 feet long; young branches thickened and with inter-petiolar ridges at the nodes, sparsely covered with minute stellate-hairy scales like the petioles, under surfaces of the leaves and the panicles. *Leaves* sub-coriaceous, 5-nerved (the lateral pair faint), elliptic-ovate to ovate, the base rounded and sub-cordate, the apex shortly acuminate

or acute; upper surface glabrous; length 2·5 to 5 in.; breadth 1·2 to 2·2 in.; petiole ·3 to ·5 in. *Panicles* both axillary and terminal, the former shorter than the leaves or slightly exceeding them, the latter longer, all rather lax, the branchlets divaricating, cymose, and with a few short, linear, deciduous bractlets. *Flowers* nearly 1 in. long (including the stamens). *Calyx-tube* oblong-campanulate or funnel-shaped, densely lepidote-stellate; the mouth expanded and obscurely 4-toothed. *Petals* obovate-oblong, blunt, glabrous. *Stamens* 8, usually equal (four sometimes shorter or obsolete); basal processes long, linear, sub-erect. *Fruit* cylindric-campanulate, sub-glabrous, crowned by the slightly enlarged limb of the calyx, ·25 in. long. Blume, Mus. Bot. I, 36 (excl. syn. Korth.); Naudin in Ann. Sc. Nat. Ser. 3, XV, 69, tab. 4 fig.; Miq. Fl. Ind. Bat. I, pt. I, 528; Triana in Trans. Linn. Soc. XXVIII, 83, tab. VII, fig. 89*b*; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 544; Cogn. in DC. Mon. Phan. VII, 557. *Melastoma pallida*, Jack in Trans. Linn. Soc. XIV, 12; DC. Prodr. III, 150; Wall. Cat. 4049. *Dissochæta ovalifolia* and *D. superba*, Naud. l.c. 76 and 77. *D. astrotricha*, Miq. l.c. Suppl. 318.

In all the provinces except the Nicobar and Andaman Islands; common.

The four stamens which are usually shorter than the other are sometimes obsolete.

6. DISSOCHÆTA GRACILIS, Blume in Flora, 1831, 498. A straggling or scandent shrub; young branches slender, bluntly 4-angled, the nodes swollen and transversely ridged, minutely scaly like the petioles, leaves and panicles. *Leaves* 5-nerved (the lateral pair slender), broadly lanceolate or oblong-lanceolate, rounded at the base and shortly acuminate at the apex; length 3 to 4·5 in.; breadth 1·5 to 1·8 in.; petiole ·2 to ·4 in. *Panicles* axillary and terminal, the former shorter than, and the latter longer than the leaves, slender, spreading, lax, many-flowered; bracts few, narrowly oblong, caducous. *Flowers* ·35 in. long, on filiform pedicels longer than themselves. *Calyx-tube* narrowly campanulate, minutely stellate-pubescent, the mouth glabrous, sub-truncate, everted, and obscurely 4-toothed. *Petals* 4, broadly ovate or sub-orbicular, blunt. *Stamens* 8; four large, perfect, rather short, with a broad truncate 2-pored apex; the four imperfect small, narrow; all with two erect, filiform flat basal appendages. *Fruit* sub-globular, crowned by the narrow limb, almost glabrous, ·1 to ·15 in. in diam. Korthals Verh. Nat. Gesch. Bot. 237; Naud. in Ann. Sc. Nat. Ser. 3, XV, 75; Miq. Fl. Ind. Bat. I, pt. I, 526; Triana in Trans. Linn. Soc. XXVIII, 83, tab. VII, fig. 89*c*; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 544; Cogn. in DC. Mon. Phan. VII, 559. *Melastoma gracile*, Jack

in Trans. Linn. Soc. XIV, 14; DC. Prodr. III, 149. *M. fallax*, Wall. Cat. 4080. ? *M. glauca*, Griff. Ic. Pl. As. 637. *M. vacillans*, var. *pallens*, Blume, Bijdr. 1074.

In all the provinces except the Nicobar and Andaman Islands. DISTRIB. Java, Borneo.

7. DISSOCHÆTA CELEBICA, Blume, Mus. Bot. I, 36. A slender creeper; young branches, petioles and under surfaces of the leaves, also the panicles, densely clothed with rusty, scurfy, stellate tomentum. *Leaves* 3-nerved, membranous, lanceolate or oblong-lanceolate, the base rounded, the apex shortly acuminate; upper surface glabrous except the stellate-pubescent midrib; length 2·5 to 5 in.; breadth 1 to 2 in.; petiole ·2 to ·25 in. *Panicles* lateral and terminal, the former slightly longer and the lateral several times longer than the leaves, ebracteate, the branches divaricating, the ultimate branches cymose, 3-flowered. *Flowers* ·3 in. long (including the stamens). *Calyx-tube* oblong-campanulate, slightly widened and 4-toothed at the mouth, somewhat longer than the pedicel. *Petals* 4, broadly oblong, blunt. *Stamens* 4; anthers equal, short, blunt and with no apical appendage, opening by 2 apical pores. *Fruit* sub-globular, crowned by the narrow limb of the calyx, faintly 8-ribbed, sparsely pubescent or sub-glabrous, ·15 to ·2 in. in diam. C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 544; Cogn. in DC. Mon. Phan. VII, 561; Miq. Fl. Ind. Bat. I, pt. I, 530; Triana in Trans. Linn. Soc. XXVIII, 83. *D. microcarpa*, Naud. in Ann. Sc. Nat. Ser. 3, XV, 72; Miq. l.c. 523. *D. bancana*, Miq. l.c. 529. *Melastoma fallax*, Wall. Cat. 4050; ? Jack in Trans. Linn. Soc. XIV, 13. *M. rubiginosum*, Wall. Cat. 4052, partly.

In all the provinces except the Nicobar and Andaman Islands; common. DISTRIB. Bangka, Celebes, Borneo.

VAR. *contracta*, King. *Panicle* solitary, terminal, short, condensed, not longer than the leaves.

PERAK; *King's Collector* 2911.

8. DISSOCHÆTA INTERMEDIA, Blume in Flora, 1831, 493. A somewhat slender creeper, resembling *D. celebica* in its other parts, but with larger flowers (·5 in. long), pointed in bud; larger fruit (·2 to ·25 in. in diam.); calyx-tube with a truncate, toothless mouth; ovate, acute petals, and longer stamens narrowed to and appendiculate at the apex. Blume, Mus. Bot. I, 35, tab. V; Naud. in Ann. Sc. Nat. Ser. 3, XV, 72; Miq. Fl. Ind. Bat. I, pt. 1, 524; Triana in Trans. Linn. Soc. XXVIII, 83, tab. VII, fig. 89 f.; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 544; Cogn. in DC. Mon. Phan. VII, 562. *Melastoma rubiginosum*, Wall. Cat. 4052 (in part).

MALACCA; *Griffith* (K.D.) 2287; *Helfer* (K.D.) 2286. PENANG and SINGAPORE; *Wallich*. PERAK; *Scortechini*. DISTRIB. Java, Borneo.

9. DISSOCHÆTA ANOMALA, King, n. sp. A creeper 15 to 20 feet long; young branches slender, slightly thickened at the nodes, at first sparsely rusty stellate-hairy, afterwards glabrous and sub-glaucous. *Leaves* ovate-oblong, the base broadly rounded, the apex shortly, abruptly and bluntly acuminate, 5-nerved (the two lateral nerves faint); upper surface glabrous; the lower sparsely stellate-hairy on the midrib and nerves, otherwise glabrous; length 3·5 to 6·5 in.; breadth 1·75 to 2·75 in.; petiole sparsely hispid, ·2 in. long. *Panicles* axillary and terminal, the former half as long and the latter twice as long as the leaves, stellate-pubescent especially at the thickened nodes; the branches divaricate, trichotomous, lax, bracteate at the divisions; the bracts ·3 in. long, oblong, blunt, involute, stellate-tomentose, their edges ciliate. *Flowers* ·3 in. long, in cymes of three. *Calyx-tube* shorter than the pedicel, narrowly campanulate, densely stellate-tomentose; the mouth without teeth, truncate, not everted. *Petals* glabrous, ovate, acuminate, forming a pointed bud. *Stamens* 4, equal and all perfect, subsessile, broad, blunt, the lateral basal appendages filamentous. *Fruit* broadly campanulate, crowned by the narrow calyx-limb, glabrous, ·15 in. in diam.

PERAK; *King's Collector* 2258, 10468.

This plant forms a collecting link between the genera *Anplectrum* and *Dissochæta* as they are defined in this work. It agrees in externals with *Anplectrum pallens*, and has the 4 stamens of that genus, but their anthers have the elongate basal processes so well developed in *Dissochæta* and not at all represented in *Anplectrum*.

10. DISSOCHÆTA SCORTECHINII, King, n. sp. Scandent; young branches slender, the nodes swollen and transversely ridged, thinly clothed with minute, pale, stellate hairs. *Leaves* ovate-lanceolate, slightly cordate at the broad base, the apex with a short, blunt point; 5-nerved (the lateral pair small); upper surface glabrous; lower rusty in colour and bearing sparse, white, stellate hairs longer than those on the stem; length 2·5 to 3·75 in.; breadth 1·5 to 2 in.; petiole densely rusty stellate-tomentose, ·1 in. long. *Panicle* solitary, narrow, terminal, shorter than the leaves, densely rusty stellate-tomentose, the branches short and few-flowered, bearing many oblong, blunt or spathulate, pale, 3-nerved almost glabrous bracts longer than the flower-bud, the lower ones much larger. *Flowers* ·3 in. long, their pedicels short. *Calyx-tube* narrowly campanulate, at first densely but afterwards sparsely stellate-tomentose; the mouth truncate, without teeth, waved but not everted, glabrous. *Petals* 4, glabrous, orbicular-ovate, acuminate, forming a pointed bud. *Stamens* 4, all equal and perfect, short, broadly ovate, the base with two long, erect, filiform appendages, the broad apex with a small, pale,

subacute appendage. *Fruit* unknown. *D. intermedia*, Scort. MSS. (not of Blume), in Herb. prop.

PERAK; *Scortechini* 23, 34. PENANG; *Curtis* 1301.

12. ANPLECTRUM, A. Gray.

Twining shrubs. *Leaves* subcoriaceous, or rarely coriaceous, opposite, short-petioled, entire, oblong, narrowed upwards, 3–5-nerved from the base. *Flowers* white, in terminal panicles sometimes leafy at the base. *Calyx-tube* funnel-shaped or ovoid, limb obscurely 4-lobed or truncate. *Petals* 4. *Stamens* 4 perfect, rarely 8, anthers attenuated upwards, opening by one pore, connective at base shortly appendaged or subnude, never with two long bristles in front, rarely with a long appendage and two small erect bristles; imperfect stamens 4, 2, or 0. *Ovary* 4-celled, free at the apex, with 4 vertical ridges; style simple; ovules many, placentas axile. *Berry* ovoid or globose, crowned with the calyx-limb. *Seeds* very many, small, falcate, obovoid; raphe long, lateral. DISTRIB. Species about 18, in Malaya and the Philippines.

- Stamens 4 perfect:—
  - Nodes of the young branches and of the lower part of the panicle with conspicuous, stellately, lepidote, bristly annuli ... ... 1. *A. lepidoto-setosum.*
  - Nodes of the young branches and of the panicle with a small smooth annulus or faint transverse ridge:—
    - Calyx-tube funnel-shaped; stamens 4, all perfect; young branches stellate-hairy ... 2. *A. glaucum.*
    - Calyx-tube ovoid to globular-ovoid; stamens 8, the anthers of 4 of them narrow and imperfect; young branches glabrous or nearly so ... ... 3. *A. pallens.*
  - Nodes not annulate; stamens 8, the anthers of 4 of them narrow and imperfect; young branches and panicles densely stellate-scaly ... ... 4. *A. divaricatum.*
- Stamens 8 perfect ... ... 5. *A. anomalum.*

1. ANPLECTRUM LEPIDOTO-SETOSUM, King, n. sp. Young branches slender, conspicuously annulate at the nodes, sparsely clothed with coarse, spreading hairs with thickened points, the very youngest also with deciduous, stellate hairs. *Leaves* oblong-lanceolate, 5-nerved; the base rounded and minutely cordate, the apex shortly caudate-acuminate; both surfaces glabrous except for a few coarse hairs near the petiole; the lower shining and pale when dry; length 4·5 to 6 in.; breadth 1·1 to 1·8 in.; petiole very short, attached to the cup-shaped, densely rufous stellate-tomentose node and like it with scattered

bristle-hairs. *Panicle* terminal, solitary, shorter than the leaves, everywhere densely rusty-tomentose with long bristles intermixed, annulate at the bases of the short, spreading, few-flowered branches. *Calyx-tube* cylindric; the mouth undulate-truncate, obscurely toothed, its outer surface stellate-lepidote with a few long bristles near the mouth. *Petals* 4, ovate, glabrous. *Stamens* 8 (4 large and 4 small); the large broad, and with a short, grooved ridge on the back near the base, blunt; the 4 small linear, very acuminate. *Capsule* ovoid-globular, truncate, nearly glabrous, ·15 in. in diam.

PERAK; *Scortechini* 2106.

2. ANPLECTRUM GLAUCUM, Triana in Trans. Linn. Soc. XXVIII, 84 (*excluding much of the synonymy*). Scandent, to 20 or 30 feet; young branches 4-grooved, stellate-hairy like the petioles and main nerves of the leaves and the inflorescence, the nodes inconspicuously annulate or transversely ridged. *Leaves* oblong-lanceolate, rounded or slightly narrowed to the often slightly cordate base, the apex shortly acuminate or acute, boldly 3-nerved; both surfaces glabrous except for some scattered, stellate hairs; length 3 to 5 in.; breadth 1 to 2 in.; petiole ·5 to ·25 in. *Panicle* large, terminal, solitary, several times larger than the leaves, pyramidal, its branches divaricate, many-flowered. *Flowers* drooping, ·4 or ·5 in. long (including the stamens). *Calyx-tube* funnel-shaped, sub-glabrous; the mouth truncate, not toothed, everted with age. *Petals* ovate-lanceolate with truncate bases, the apex acuminate. *Stamens* 4; *anthers* much curved, all perfect, their bases not lobed but with a corrugated membranous process in front. *Ovary* prominently 4-winged. *Fruit* truncate, sub-globular, glabrous, ·2 in. long (when dry). C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 545; Cogn. in DC. Mon. Phan. VII, 566. *A. cyanocarpum*, Kurz in Journ., As. Soc., 1877, pt. 2, p. 78 (not of Triana). *Melastoma glauca*, Jack in Trans. Linn. Soc. XIV, 15; DC. Prodr., 151. *M. cernuum*, Wall. Cat. 4055 (not of Roxb.). *Osbeckia tetrandra*, Roxb. Fl. Ind. II, 224. *Dissochæta glauca*, Blume in Flora, 1831, p. 501. *D. spoliata*, Naud. in Ann. Sc. Nat. Ser. 3, XV, 69, t. 4, fig. 1.

In all the provinces, common. DISTRIB. Sumatra, Java, Borneo.

3. ANPLECTRUM PALLENS, Blume, Mus. Bot. I, 38. Scandent, to 30 or 40 feet; young branches terete, glabrous or minutely puberulous, especially near the slightly thickened and transversely ridged nodes, round. *Leaves* oblong, the base rounded, the apex abruptly, bluntly and shortly sub-caudate-acuminate, 5-nerved (the marginal pair slender), the edges (when dry) slightly recurved; upper surface glabrous, the lower minutely and scantily stellate-puberulous; length 1·5 to 4·5 in., breadth ·5 to 1·5 in.; petiole ·1 to ·2 in. *Panicles* axillary (about as

long as the leaves) and terminal (much longer than the leaves), slender, spreading, lax, rather few-flowered, with a small, blunt, oblong, deciduous bract under each branch, finely rufous stellate-pubescent. *Flowers* about ·4 in. long (including the stamens). *Calyx-tube* ovoid to globular-ovoid, densely rufous-puberulous when young, glabrous when old, the mouth slightly expanded and with very small teeth. *Petals* ovate, acute, glabrous. *Anthers*; the four large much curved and sub-acute; the rudimentary linear, acuminate. *Capsule* globose-obovoid, glabrous, ·15 in. in diam. Naud. in Ann. Sc. Nat. Ser. 3, XV, 303; Triana in Trans. Linn. Soc. XXVIII, 303; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 545; Cogn. in DC. Mon. Phan. VII, 564. *Melastoma petiolare*, Wall. Cat. 4053.

In all the provinces except the Andaman and Nicobar Islands; not uncommon. DISTRIB. Sumatra, Borneo.

4. ANPLECTRUM DIVARICATUM, Triana in Trans. Linn. Soc. XXVIII, 84 (in part), tab. VII, fig. 90*b*. Scandent, to 20 or 30 feet; young branches obscurely quadrangular, and like the petioles, nerves of the leaves on both surfaces, and the inflorescence, densely covered with tawny, stellate scales, not annulate at the nodes. *Leaves* lanceolate, acute or sub-acute, the base minutely cordate, 5-nerved, the marginal pair slender; both surfaces, but especially the lower, with glandular-punctate scales between the nerves and veins; length 2 to 3 in.; breadth ·6 to 1·1 in.; petiole ·15 to ·25 in. *Panicle* solitary, terminal, pyramidal, several times as long as the leaves, the branchlets divaricate, each with two ovate-lanceolate, ciliate, furfuraceous, deciduous bracts at its base and three flowers in a cyme at the apex. *Flowers* ·4 in. long, on short pedicels. *Petals* oblong, acute. *Calyx-tube* narrowly obovoid, campanulate, truncate, densely furfuraceous stellate-tomentose. *Anthers* 8; the 4 large thick and much curved, obtuse; the smaller narrow. *Capsule* globose-obovoid, with a narrow, everted rim, length ·15 to ·2 in. C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 546; Cogn. in DC. Mon. Phan. VII, 567. *Melastoma divaricatum*, Willd. Spec. Pl. II, 596; DC. Prodr. III, 150. *M. polyanthum*, Benth. in Wall. Cat. 4051. *Dissochæta divaricata* and *D. pspericarpa*, Naud. Ann. Sc. Nat. Ser. 3, XV, 70 and 71. *D. anceps*, Naud. l.c. 70. *D. palembanica*, Miq. Fl. Ind. Bat. Suppl. 317.

MALACCA; *Griffith* (K.D.) 2288/1: *Maingay* (K.D.) 794: *Harvey*. PENANG; *Wallich* 4051. PERAK; *King's Collector* 369. DISTRIB. Java, Borneo, Sumatra.

5. ANPLECTRUM ANOMALUM, King and Stapf, n. sp. A woody creeper, 20 to 100 feet long; young branches as thick as a wheat-straw, terete, covered with stellate, rusty scurf. *Leaves* coriaceous, obovate or

oblong, blunt, much narrowed to the base, 3-nerved, glabrous on the upper, rusty stellate-hairy on the lower surface like the petioles and inflorescences; length 1 to 1·5 in.; breadth ·6 to ·9 in.; petiole ·2 in. *Panicles* terminal, sometimes leafy, 3 to 6 in. long, lax, the branches in pairs, divaricate, many-flowered, minutely bracteolate at the divisions. *Flowers* ·35 in. long, the pedicels somewhat longer. *Petals* oblong, obtuse, waxy, reflexed, pale greenish-white. *Stamens* 8, equal; anthers inflexed in aestivation, lanceolate-subulate, the base of the lobes produced into an elongated halbert-shaped process with two erect subulate processes at its broad upper end. *Fruit* (not quite ripe) ovoid-globose, greenish-yellow, ·2 in. in diam.

PERAK; *King's Collector* 5779, 10357.

This plant differs from *Anplectrum*, as the genus has hitherto been limited, in having 8 anthers, each of which has a very much produced halbert-shaped basal process, from which two erect hair-like appendages originate at the upper or broad end. The plant agrees better with *Anplectrum* than with any other *Melastomaceous* genus, but it might possibly be better treated as the basis of a new one.

13. MEDINILLA, Gaud.

Branching shrubs, erect or scandent. *Leaves* opposite or whorled, rarely alternate, entire, often fleshy, mostly glabrous, usually longitudinally 3–9-nerved. *Flowers* in terminal panicles or lateral cymes, white or rose, with or without bracts, 4- or 5-, rarely 6-merous. *Calyx-tube* ovoid or cylindric, limb truncate or obscurely toothed. *Stamens* twice as many as the petals, equal or nearly equal (rarely unequal); anthers opening at the top by one pore; connective not (or very shortly) produced at the base but having two tubercles in front and a spur behind. *Ovary* inferior, 4–6-celled, usually glabrous at the apex; style filiform; ovules very many, placentas axile. *Berry* crowned by the limb of the calyx. *Seeds* very many, ovoid or subfalcate, raphe often thickened and excurrent.—DISTRIB. Species about 100; mainly in Malaya, East Bengal and Ceylon; a few in the Fiji Archipelago and in the East African islands.

Flowers 4-merous:—
Leaves alternate ... ... 1. *M. scandens.*
Leaves in whorls (large) ... ... 2. *M. speciosa.*
Leaves opposite:—
Flowers in terminal panicles, anthers dissimilar ... 3. *M. heteranthera.*
Flowers in lateral panicles, anthers similar:—
Anther-cells with tubercles at their bases in front, and a short spur from the connective behind:—
Flowers 1 in. long ... ... 4. *M. venusta.*

Flowers under ·5 in. long :—
Leaves petiolate ... ... 5. *M. Hasseltii.*
Leaves sessile ... ... 6. *M. Scortechinii.*
Anther-cells with tubercles at the base in front, but no spur from the connective behind ... 7. *M. Maingayi.*
Flowers 5-merous :—
Leaves in whorls :—
Leaves elliptic or obovate, blunt, 1 to 2·75 in. long, fruit ·15 in. in diam. ... ... 8. *M. Clarkei.*
Leaves oblanceolate or narrowly obovate, acuminate, 3 to 5 in. long ; fruit ·4 in. in diam. ... ... 9. *M. crassinervia.*
Leaves elliptic-rotund, blunt, 2·5 to 5·5 in. long; fruit ·35 in. in diam. ... ... 10. *M. perakensis.*

1. MEDINILLA SCANDENS, King, n. sp. A climber, 15 to 30 feet long, rooting and adhering to trees ; the stems rough, as thick as a swan's quill. *Leaves* alternate, glabrous, long-petioled, subcoriaceous, elliptic or ovate-oblong, shortly acuminate, the base cuneate ; nerves 5 to 7, mostly from the midrib above its base ; length 4·5 to 9 in. ; breadth 2·5 to 6 in. ; petioles 1·5 to 7 in. *Flowers* ·4 in. long, in dense fascicles in the axils of fallen leaves, on rusty-puberulous, minutely bracteolate pedicels. *Calyx-tube* narrowly campanulate ; the limb very slightly expanded, truncate, very obscurely toothed. *Petals* 4, ovate-oblong, acute. *Stamens* 8 ; *anthers* narrowly elliptic, with a long apical 1-pored beak ; and at the base a short, broad, blunt process from the connective behind, the lobes of the anthers slightly produced in front and minutely tuberculate.

PERAK ; *Scortechini* 86 and 150 ; *King's Collector* 1814.

This resembles *M. alternifolia*, Blume, but has a much shorter spur from the connective at the base of the anthers. It has also larger leaves and more numerous flowers in the fascicles.

2. MEDINILLA SPECIOSA, Blume in Flora, 1831, p. 515. A glabrous shrub or small tree, not epiphytal ; young branches as thick as the little finger, 3- or 4-angled ; the bark shining, pale when dry, bearing at the nodes numerous stout, subulate bristles ·5 in. long. *Leaves* large, subcoriaceous, in whorls of 3 (rarely of 4) or in pairs, sessile, or very shortly petiolate, oblanceolate or obovate-oblong, sometimes elliptic, acute, the base cuneate, nerves 7 to 9 mostly from the midrib above its base, all except the lowest pair bold, the veins slender ; length 6 to 12 in. ; breadth 2·75 to 5 in. *Panicles* lateral and terminal, 4 to 8 or even 14 in. long, on peduncles equally long, many-flowered ; the branches with a whorl of small reflexed bracts at their bases ; whorled, spreading, minutely bracteolate at the divisions. *Calyx-tube* cupular, slightly constricted below the narrow, minutely 4-toothed limb. *Petals* 4, ovate-

acute. *Fruit* ovoid, ·3 in. in diam. Bot. Mag. t. 4321; Morren in Ann. Soc. Hort. Gand. V, 281; Naud. in Ann. Sc. Nat. Ser. 3, XV, 291; Miq. Fl. Ind. Bat. I, pt. I, p. 540; Triana in Linn. Trans. XXVIII, 87; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 549. *Melastoma eximium*, Blume Bijdr. (not of Jack). *Melastoma speciosum*, Reinw. ex Blume, in Flora, 1831, 516.

MALACCA; *Maingay* (Kew Distrib.) 798. PENANG; *Hullett* 203; *Curtis* 874; *King's Collector* 1595. PERAK; *Wray* 3218; *King's Collector* 2652. DISTRIB. Moluccas, Java, Sumatra.

3. MEDINILLA HETERANTHERA, King, n. sp. Epipytal and terrestrial; branches slender, smooth, reddish when fresh, drying dark purplish-brown. *Leaves* of the pairs somewhat unequal, ovate-lanceolate to lanceolate, acuminate, the base slightly narrowed, glabrous, 3-nerved; length 2·5 to 5·25 in.; breadth 1 to 1·8 in.; petioles ·3 to ·8 in. *Panicles* terminal on the branches, half as long as the leaves, corymbosely cymose, 5- or 6-flowered, minutely bracteolate. *Flowers* ·75 in. long, their pedicels much shorter. *Calyx-tube* cylindric, the mouth wide and with 4 broad, shallow teeth. *Petals* 4, ovate-lanceolate, shortly acuminate. *Stamens* 8; *anthers* unequal, the larger four twice as long as the shorter four, all curved, much acuminate and with two tubercles at the base in front, the shorter 4 with a short spur on the connective behind, the larger with no spur. *Fruit* globular-ovoid, crowned by the wide calyx-limb, ·35 in. in diam.

PERAK; *Scortechini* 341; *King's Collector*, 3291, 3644, 6304, 6904; *Wray* 397; at elevations of from 3000 to 4500 feet.

This resembles *M. Horsfieldii*, Miq.,—a species from Java and Borneo—which however has 5-merous flowers, obovate petals and leaves of thinner texture. According to Scortechini the petals are waxy white tinged with red and the stamens are yellow.

VAR. *latifolia*. *Leaves* broadly elliptic, shortly acuminate, the base cuneate, 2·5 to 3·75 in. long and 1·5 to 2 in. broad.

PERAK; *King's Collector* 8017; *Wray* 268.

4. MEDINILLA VENUSTA, King, n. sp. Epiphytal, 2 to 4 feet long, glabrous; branches stout, with large, scattered tubercles, glabrous. *Leaves* large, opposite, thinly coriaceous, sessile, elliptic, shortly acuminate, narrowed to the base, boldly 3-nerved above the base with often a faint, small, basal, marginal pair; length 6 to 9 in.; breadth 2·75 to 4 in. *Cymes* much shorter than the leaves, laxly umbellate, axillary or from the axils of fallen leaves, about 6-flowered; the pedicels slender, bibracteolate at the base. *Flowers* nearly 1 in. long. *Calyx-tube* campanulate, ·35 in. long, with a narrow, obscurely 4-toothed limb.

Petals 4, broadly ovate, acute. *Stamens* 8; *anthers* equal, linear-lanceolate, much acuminate, curved, the tubercles at the front of the base as long as the posterior basal spur from the connective. *Fruit* unknown.

PERAK; *King's Collector* 2390.

5. MEDINILLA HASSELTII, Blume in Flora, 1831, p. 513. Epiphytal on trees, 3 or 4 feet high; branches slender, terete, pale, more or less prominently warted (the warts black). *Leaves* opposite, coriaceous, oblong-lanceolate, acuminate, narrowed to the rounded base, 3-nerved, with sometimes a faint, additional lateral pair; length 4·5 to 5·5 in.; breadth 1·25 to 1·75 in; petioles ·15 to ·35 in. *Cymes* axillary or from the axils of fallen leaves, less than half as long as the leaves, (more than half as long in VAR. *Griffithii*), broader than long; the branches divaricate, 8–12-flowered, minutely bracteolate. *Flowers* ·35 in. long. *Calyx-tube* campanulate-cylindric, somewhat constricted below the minutely 4-toothed mouth. *Petals* 4, obovate-oblong. *Stamens* 8, equal; the anthers linear-oblong, somewhat curved, the base with two short, black, conical protuberances in front and a similar one behind. *Fruit* globular, truncate, ·2 to ·25 in. in diam. Miq. Fl. Ind. I, pt. I, 542; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 547; Cogn. in DC. Mon. Phan. VII, 586. *Melastoma laurifolium* in Wall. Cat. 4084 (not of Blume). *Medinilla crassifolia*, Triana in Trans. Linn. Soc. XXVIII, 86 (in part).

MALACCA; *Griffith* (Kew Distrib.) 2282; *Maingay* (Kew Distrib.) 797, *Wallich* 4084. PERAK; very common. SINGAPORE; *Anderson*. SUNGEI UJONG; *Ridley* 2205, SELANGORE; *Curtis* 2334; *Ridley* 286. PANGKORE; *Curtis* 1642.

DISTRIB. Java, Sumatra.

VAR. *Griffithii*, C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 547. *Cymes* much branched, more than half as long as the leaves, many-flowered.

MALACCA; *Griffith* (Kew Distrib.) 2282.

6. MEDINILLA SCORTECHINII, King, n. sp. Epiphytal, 3 or 4 feet high; stems as thick as a goose-quill, the bark brown (when dry), sparsely verrucellate. *Leaves* opposite, coriaceous, glabrous, sessile, stem-clasping, oblong-ovate to oblong, shortly acuminate, the base sub-cordate, 3-nerved, with occasionally a faint pair at the margin; length 4·5 to 6·5 in.; breadth 1·5 to 2·75 in. *Panicles* cymose, axillary, rather shorter than the leaves, very lax, spreading; the branches slender, minutely bracteolate at the divarications; the branchlets compressed, sometimes 2-winged. *Flowers* nearly ·4 in. long, on pedicels as long as themselves. *Calyx-tube* campanulate, the mouth not much

expanded, obscurely 4-toothed. *Petals* 4, oblong, acute, reflexed. *Stamens* 8; anthers curved, linear-lanceolate, with a short 1-pored apical process; the base with a short, sharp, downward-pointing spur from the connective; the bases of the anther-cells each with a linear, curved, small tubercle as long as the spur, and like it dark in colour when dry. *Fruit* ovoid-globular, ·2 in. in diam.

PERAK; *Scortechini* 307, 478, 622; *Curtis* 1297; *Wray* 391, 1739; *King's Collector* 4188.

The nearest ally of this is *M. javanensis*, Bl.

7. MEDINILLA MAINGAYI, C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 549. A small epiphyte with slender, terete, pale, smooth branches. *Leaves* opposite, thinly coriaceous, obovate, with rounded apices and cuneate bases, obscurely 3-nerved, the lower surface rather paler than the upper when dry; length ·65 to 1·25 in.; breadth ·5 to ·75 in.; petiole ·05 to ·2 in. *Cymes* much shorter than the leaves, with short, divaricate, broadly bracteolate branches, few-flowered. *Flowers* ·25 in. long, their pedicels shorter. *Calyx-tube* narrowly campanulate, with a slightly expanded, minutely 4-toothed limb. *Petals* 4, lanceolate, sparsely strigose outside. *Stamens* 8; anthers lanceolate, without protuberences at the base in front, but with a short spur behind. *Fruit* unknown. Cogn. in. DC. Mon. Phan. VII, 586.

MALACCA; *Maingay* (Kew Distrib.) 806, 807. PERAK; *Wray* 3781. SINGAPORE; *Ridley* 1652, 2018. PAHANG; *Ridley* 2663.

8. MEDINILLA CLARKEI, King, n. sp. A small epiphyte; young branches with dark, rough, tubercled bark. *Leaves* in whorls of three or four, broadly elliptic to obovate, blunt or subacute, the base cuneate; the upper surface rugulose and green when dry, the lower pale-brown; length 1 to 2·75 in., breadth ·75 to 1·8 in.; petiole ·4 to ·8 in., puberulous. *Cymes* about as long as the leaves or slightly longer, from the axils of fallen leaves, on slender pedicels from ·5 to ·75 in. long, the branches whorled, spreading, minutely bracteolate at the divisions; pedicels slender. *Flowers* 20 to 30, ·3 in. in length. *Calyx-tube* cupular, the mouth truncate and usually obscurely toothed, sometimes distinctly 5-toothed. *Petals* 5, broadly ovate to rotund, blunt. *Stamens* 10; anthers linear-lanceolate; the base with two small tubercles in front, and a small spur behind. *Fruit* globular-truncate, ·15 in. in diam. *M. rosea*, C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 547 (*not of Gaudichaud*).

MALACCA; *Griffith* (Kew Distrib.) 2282; *Maingay* (Kew Distrib.) 796; *Stoliczka* in Herb. Calc. PERAK; *Scortechini* 243; *Wray* 206, 412, 3831, 4084; *King's Collector* 7333; at elevations of from 3000 to 5000 feet.

M. rosea, Gaud., to which this plant has been referred in the Flora of British India, is a tetramerous species from the Marianne Islands. It has, moreover, larger flowers than this and larger, more acute leaves. This plant varies in the size of its leaves: specimens collected at the highest elevations having the largest leaves. The structure of the flowers is, however, uniform.

9. MEDINILLA CRASSINERVIA, Blume in Flora, 1831, 510. Branches with pale bark, the older terete, the youngest striate when dry. *Leaves* in whorls of 3, coriaceous, broadly oblanceolate, or narrowly obovate, shortly and abruptly acuminate, much narrowed to the base, 3-nerved from a little above the base, occasionally with two short lateral faint nerves from the very base; length 3 to 5 in.; breadth 1·5 to 2 in.; petiole ·35 to ·75 in. *Flowers* in short fascicles on the stem below the leaves, in few-flowered pedunculate cymes, mixed with a few solitary, on pedicels ·5 in. long. *Calyx-tube* ovoid-campanulate, the mouth truncate and almost entire. *Stamens* 10, subequal; the basal anterior processes broad and about as long as the filiform posterior spur. *Fruit* globose with a cylindric truncate mouth, ·4 in. across. Blume Rumphia I, 15; Miq. Fl. Ind. Bat. I, pt. I, 545; Cogn. in DC. Mon. Phan. VII, 574. *M. macrocarpa*, Clarke (not of Blume) in Hook. fil. Fl. Br. Ind. II, 547.

SINGAPORE; *Ridley* 1637. PENANG; *Curtis* 2225. PERAK; *Wray* 1821. MALACCA; *Maingay* (Kew Distrib.) 799. DISTRIB. Borneo.

True *M. macrocarpa*, Bl., is represented in the Kew Herbarium by a single specimen collected by Blume in the Moluccas. The flowers on it have, as described by the author of the species, an irregularly toothed calyx-limb. The plant now described differs in having an almost entire truncate limb, and I follow Cogniaux in referring it to *M. crassinervia*, Bl. In the Flora of British India it is, however, referred to *M. macrocarpa*, Bl.

10. MEDINILLA PERAKENSIS, King, n. sp. Epiphytal; branches terete, glabrous, tubercled. *Leaves* in whorls of 3 or 4, coriaceous, elliptic-rotund, blunt, the base rounded and narrowly cordate, glabrous; 5-nerved, the lateral pair of nerves faint; length 2·5 to 5·5 in.; breadth 1·75 to 3·75 in.; petioles ·6 to 1·2 in. *Panicles* cymose, on rather long peduncles from the axils of fallen leaves, shorter than the leaves, lax, 12- to 20-flowered; branches spreading, whorled, 2–3-chotomous. *Flowers* ·5 in. long, their pedicels ·35 in. *Calyx-tube* cupular; the limb but little expanded, cut into 5 shallow, broad teeth. *Petals* 5, oblong. *Anthers* 10, curved, with 2 yellow tubercles at the base in front and a short spur behind from the connective. *Fruit* ·35 in. in diam.; the seeds oblong, obtuse, with an excurrent tail, the testa pitted.

PERAK; *Scortechini* 410; *Wray*.

Collected only by the late Father Scortechini and Mr. Wray. According to the field-note of the former, the petals and anthers are white and the fruit bluishcarnation. The nearest ally of this is *M. montana*, Cogn.—a New Guinea species—which has however, longer flowers, a wider calyx-tube, more slender branches which are moreover smooth, and narrower leaves narrowed at the base.

14. POGONANTHERA, Blume.

Shrubs; branches round, minutely scaly. *Leaves* opposite, petioled, oblong or ovate, entire, glabrous, 3-nerved. *Flowers* small, pulverulent, in small, terminal panicles having opposite, cymose branches. *Calyx-tube* narrowly campanulate, subquadrangular; limb 4-toothed. *Petals* 4, oblong-lanceolate. *Stamens* 8, equal; anthers oblong, acute, opening by a terminal pore, not produced at the base; connective at the base bearded behind with a tuft of hairs, not spurred. *Ovary* half-inferior, 4-celled, with a tuft of hairs at the apex; style filiform; ovules very many, placentas axile. *Berry* small, globose, 4-celled, crowned with the calyx-limb. *Seeds* very many, obovoid-oblong, smooth. DISTRIB. Species 2; Malayan.

POGONANTHERA PULVERULENTA, Blume in Flora, 1831, 521. An epiphytic shrub, all parts (but especially the calyx-tube) bearing pale yellow scales; the stems sparsely lenticellate. *Leaves* rather fleshy, ovate-oblong to oblong-lanceolate, acute or shortly acuminate, the base more or less narrowed and bituberculate, 3–5-nerved; the margins obscurely crenate and slightly reflexed; upper surface glabrous, the lower paler and minutely pulverulent; length 3 to 6·5 in.; breadth 1·75 to 3 in.; petiole ·25 to ·6 in., stout. *Panicles* terminal, 2 to 3 in. long and equally broad, cymose, the branches spreading. *Calyx-tube* sub-cylindric, constricted below the expanded 4-toothed mouth, very scaly. *Petals* 4, oblong, densely scaly externally. *Stamens* 8; anthers lanceolate, the connective with a tuft of hairs at the base behind. *Fruit* pisiform, ·15 in. in diam. Korth. Verh. Nat. Gesch. Bot. t. 65; Griff. Notul. IV. 678; Miq. Fl. Ind. Bat. I, pt. I, 553; Triana in Trans. Linn. Soc. XXVIII, 89; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 550; Cogn. in DC. Mon. Phan. VII, 610. *P. reflexa*, Blume in Flora, 1831, 521; Mus. Bot. Lugd. Bat. I, 24; Naud. Ann. Sc. Nat. Ser. 3, XV, 303, tab. 15, fig. 1; Triana l.c. 89; Beccari Malesia, II, 241, tab. LIX, 4–5. *P. squamulata*, Korth. (ex Blume) Mus. Bot. I, 24. *Melastoma reflexa*, Reinw. ined. (ex Blume in Flora, 1831, 521). *M. rubicunda*, Jack in Trans. Linn. Soc. XIV, 19; Wall. Cat. 4086. *M. pulverulenta*, Jack in Trans. Linn. Soc. XIV, 19; DC. Prodr. III, 149; Blume in Bijdr., 1072.

SINGAPORE; PERAK; MALACCA; PENANG; common. DISTRIB. Java, Sumatra, Borneo.

I have followed Mr. Clarke in reducing *P. reflexa*, Bl. here, as I can find no tangible character to separate it. *P. reflexa* is said to have white tumid petals not toothed on the margin, while typical *P. pulverulenta* is described as having red petals with a single tooth on each margin. The union of the two species was suggested by Naudin.

15. PACHYCENTRIA, Blume.

Glabrous, often scandent shrubs, with cylindric or obscurely angled, pulverulent branches. *Leaves* somewhat fleshy, oblong or ovate-lanceolate, entire or obscurely crenulate. *Flowers* small, rose-coloured, corymbose, the pedicels 2-bracteolate, 4-merous. *Calyx-tube* ovoid or turbinate, the part beyond the ovary angular, constricted below the obscurely 4-toothed mouth. *Petals* ovate or oblong, subacute or acuminate. *Stamens* 8, equal; anthers linear-oblong or subulate, rostrate at the apex and minutely 1-pored; the connective not produced at the base, inappendiculate in front but minutely spurred at the back. *Ovary* adherent beyond its middle, 4-celled, its apex free, conic, angled; style filiform, the stigma obtuse or capitate. *Berry* globose, crowned by the limb of the calyx. *Seeds* dimidiately obovoid, the raphe lateral. DISTRIB. About 12 species, all Malayan.

PACHYCENTRIA TUBERCULATA, Korth. Ver. Nat. Gesch. Bot. 246, t. 63. Epiphytic; branches as thick as a swan's quill, glabrous below but with rusty scurf near the apices, the bark pale; the roots bearing woody tubercles. *Leaves* somewhat fleshy, narrowly elliptic-oblong, subacute, narrowed at the base, the edges entire, 3-nerved; length 2·5–4·5 in.; breadth ·9–1·25 in.; petioles ·15–·2 in. *Panicles* terminal or axillary, pedunculate; the branches spreading, cymose, 2–2·5 in. long and as wide. *Flowers* ·25 in. long, the pedicels shorter. *Calyx-tube* campanulate, the mouth truncate, obscurely 4-lobed. *Petals* 4, lanceolate. *Stamens* 8, equal, shortly spurred at the base behind. *Fruit* globular, glabrous, ·15 in. in diam. Blume, Mus. Bot. Lugd. Bat. I, 23; Miq. Fl. Ind. Bat. I, pt. I, 552; Triana in Linn. Trans. XXVII, 89, tab. VII, fig. 95*a*.

PERAK; *King's Collector* 1707, 10569; *Wray* 3422; *Scortechini* 260, 550, 1961. SINGAPORE; *Anderson* 55. PENANG; *Curtis* 347; *Hullett* 158. DISTRIB. Borneo, Burma (Tenasserim, *Griffith*).

16. ASTRONIA, Blume.

Shrubs with opposite, petioled, ovate or oblong, entire, 3-nerved leaves. *Flowers* in terminal panicles, small, white or purple. *Calyx-tube* campanulate; limb irregularly truncate or 3–8-lobed. *Petals* 4–5. *Stamens* 8–10–12, equal; filaments short, broad; anthers short, obtuse, opening by slits down the front, connective spurred at the base or unappendaged. *Ovary* inferior, 2–5-celled, glabrous at the apex; style short, stigma capitellate; ovules numerous, placentas axile, nearly basal. *Capsule* finally breaking up irregularly. *Seeds* very many, linear, raphe excurrent.—DISTRIB. Species 24; in Malaya and the Pacific Islands.

ASTRONIA SMILACIFOLIA, Triana in Trans. Linn. Soc. XXVIII, 152. Young shoots, petioles, under surfaces of the young leaves and inflorescence rufous-lepidote. *Leaves* oblong, tapering to each end, the transverse nerves stout and distant; length 3·5–5·5 in., breadth 1·5–2·5 in.; petiole ·75–1 in. *Panicle* usually terminal, condensed, 1–2 in. in diam.; branches numerous, short, the pedicels shorter than the globular, minutely 5-toothed calyx-tube. *Petals* reflexed, obovate. *Fruit* subglobular, truncate at the apex, ·25 in. in diam. C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 550; Cogn. in DC. Mon. Phan. VII, 1094. *Melastoma smilacifolia*, Wall. Cat. 4057.

PENANG; *Wallich, Curtis.* MALACCA; *Maingay* (K.D.) 808. PERAK; *Scortechini* 683; *Wray* 2813.

VAR. *lepidophylla*, Scort. MSS. Arboreous; inflorescence, leaves on the under surface and petioles (when young) densely covered with deciduous scales.

PERAK; *Scortechini* 1875; *King's Collector* 7270, 2027.

This variety is described by Scortechini and Kunstler as a tree 50–80 feet high, the typical form never being more than a large bush.

17. PTERNANDRA, Jack.

Large shrubs or trees, glabrous or minutely pubescent. *Leaves* sub-coriaceous or coriaceous, opposite, short-petioled or sub-sessile, entire, 3–5-nerved. *Flowers* solitary and axillary on long peduncles, or in axillary or teminal, often very short, and clustered cymes; the pedicels often 2-bracteolate. *Calyx-tube* campanulate or hemispheric, tesselate, verrucose, or covered with more or less adpressed, often puberulous scales; the mouth truncate, often 4-toothed. *Petals* 4, ovate or oblong, blueish or white. *Stamens* 8, equal in length, but the anthers of some of them often imperfect, perfect anthers broad, blunt, shortly spurred behind but never in front, dehiscing by slits, the filaments stout, often geniculate. *Ovary* inferior, 4-celled: the apex glabrous, depressed or flat; *style* filiform; *stigma* clavate; *ovules* numerous, placentas sub-basal. *Berry* subglobose or ovoid, truncate or surmounted by the calyx-teeth, scaly or smooth. *Seeds* cuneate-ovoid, or obovoid, angular.—DISTRIB. Species about 12; in Malaya and the Philippines.

Calyx-tube tesselate outside, not covered with distinct scales ... ... 1. *P. cærulescens.*
Calyx-tube covered with large distinct scales:—
    Young branches and under surfaces of leaves rusty-pubescent; calyx-tube ·2–·3 in. long, covered with more or less spreading scales; teeth of calyx spreading, elongate, acuminate ... ... 2. *P. echinata.*
    Young branches and under surfaces of leaves glabrous; calyx-tube ·15 in. long, its scales adpressed; teeth of calyx broadly triangular, blunt, reflexed ... ... 3. *P. Griffithii.*

1. PTERNANDRA CŒRULESCENS, Jack in Mal. Misc. II, 61. A tree; young branches cylindric with deciduous, dark-brown, glabrous bark and slightly thickened nodes with obscure transverse ridges. *Leaves* chartaceous or sub-coriaceous, broadly ovate, ovate-lanceolate, ovate-oblong or elliptic, much narrowed at the base, the apex shortly acuminate, 3–5-nerved; both surfaces glabrous; length 2·5–5 in. (10 in. in var. 2); breadth 1·25–2·5 in., (to 5 in. in var. 2) petiole ·1–·2 in. *Flowers* in short, axillary, pedunculate cymes (often several from one axil), or in terminal cymes, shorter than the leaves. *Calyx-tube* cylindric-campanulate, ·15 in. long, tesselate; the mouth truncate but with 4 small, erect, triangular teeth. *Petals* thick, ovate, reflexed after expansion. *Stamens* 8, equal in length; the filaments short, geniculate; perfect anthers 4 or 5, broadly ovate, blunt, shortly spurred behind, the remaining 3 or 4 imperfect, as long as but much narrower than the perfect. *Fruit* turbinate or sub-hemispheric, truncate, nearly smooth, ·15–·3 in. in diam. Wall. Cat. 4077; Triana in Trans. Linn. Soc. XXVIII, 153; Kurz, For. Fl. I, 509 and in Journ. As. Soc. 1877, pt. II, 79; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 551; Cogn. in DC. Mon. Phan. VII, 1103. *Ewyckia cyanea*, Blume Rumph. I. 24, t. 8; Miq. Fl. Ind. Bat. I, pt. I, 568; Triana l.c. *E. Jackiana*, Walp. Rep. V. 724. *Apteuxis trinervis*, Griff. Notul. IV, 672.—*Nov. Gen.* Roxb. Fl. Ind. II, 225.

In all the provinces except the Andaman Islands.

A common and variable plant of which four forms seem worthy of separation as varieties. These, however, pass into each other by numerous connecting specimens. One variety (*Jackiana*) differs from the typical-plant in having few-flowered almost sessile cymes; a second (*capitellata*) has sub-sessile cymes and much larger leaves and the third (*paniculata*) is probably only an example of fasciation.

VAR. 1. *Jackiana*, Clarke in Fl. Br. Ind. II, 551. *Flowers* in very short, few-flowered, almost sessile, axillary cymes. *Leaves* as in the typical form but with slightly longer petioles.

In all the provinces except the Andaman and Nicobar Islands, equally abundant with the typical form.

VAR. 2. *capitellata*, King. *Leaves* thicker in texture than in the typical form (sub-coriaceous), broadly elliptic to sub-orbicular, with 3 very strong nerves and a fainter marginal pair; length 4·5–10 in.; breadth 2·75–5 in., petiole ·2–·3 in. *Flowers* in dense, very shortly-stalked, axillary glomeruli composed of numerous 3-flowered cymes very much shorter than the leaves. *Pternandra capitata*, Jack in Mal. Misc. II, addenda prefixed to the paper p. 3; Wall. Cat. 4079; W. and A. Prodr. 325; Triana in Trans. Linn. Soc. III, 153; Kurz, For. Fl. I, 509 and in Journ. As. Soc. 1877, pt. II, 79; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 551; Cogn. in DC. Mon. Phan. VII, 1103. *Ewyckia capitellata*, Walp. Rep. V, 724; Miq. Fl. Ind. Bat. I, pt. I, 568. *E. medinilliformis*, Naud. in Ann. Sc. Nat. Ser. 3, XVIII, 261.

SINGAPORE; *Wallich* 4079. PENANG; *Curtis* 67; *King*. PERAK; *Scortechini* 43, 1043; *Wray* 1971. MALACCA; *Maingay* 802 (K D.); *Helfer* (K.D.) 2279.

VAR. 3. *paniculata*, King. *Flowers* in large, lax, terminal, much branched, few-flowered, leafy and bracteolate panicles. *Leaves* of the stem 2–6 in. long and from ·9–2·75 in. broad, those of the panicle from ·75–2 in. long and ·15–·8 in. broad. *P. paniculata*, Benth. in Wall. Cat. 4080; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 551; Cogn. in DC. Mon. Phan. VII, 1104. *Ewyckia latifolia*, Blume Mus. Bot. I, 6. *E. cyanea*, var. *latifolia*, Korth. ex Miq. Fl. Ind. Bat. I, pt. I, 568. *E. paniculata*, Miq. l.c. Suppl. 321. *Pternadra latifolia*, Triana in Linn. Trans. XXVIII, 153.

PENANG; *Wallich* 4080; *Curtis* 2768. MALACCA; *Griffith* (K.D.) 2273. PERAK; *Scortechini* 248, 1303; *Wray* 92. DISTRIB.; Borneo, Bangka.

2. PTERNANDRA ECHINATA, Jack, Mal. Mis. II, n. 9 and add. prop. 3. A small tree; young branches quadrangular, thickened and with transverse ridges at the nodes, minutely rusty-pubescent. *Leaves* sub-coriaceous, boldly 3-nerved, lanceolate or oblong-lanceolate, 3-nerved, narrowed to the base, shortly acuminate at the apex; upper surface glabrous; the lower puberulous or sub-glabrous, minutely reticulate; length 2·5–4·5 in.; breadth ·75–1·75 in.; petiole ·05–·2 in. *Flowers* axillary and solitary on pedicels longer than themselves, or in threes in terminal pedunculate cymes, the pedicels of both sets of flowers with one or more pairs of curved, linear-oblong bracteoles. *Calyx-tube* widely campanulate, ·2–·3 in. long, closely covered with triangular rusty-pubescent scales, those nearest the mouth longest, most acute, and most persistent; the mouth truncate and with 4 narrow, acuminate teeth. *Petals* broadly ovate-quadrate, abruptly and shortly acute, the edges undulate, blue. *Anthers* broadly ovate, on thick short filaments.

Fruit sub-hemispheric, truncate, sub-echinate, ·35 in. in diam. Wall. Cat. 4078. *Kibessia echinata*, Cogn. in DC. Mon. Phan. VII, 1108. *Kibessia simplex*, Korth. Verh. Nat. Gesch. Bot. 253; Blume, Mus. Bot. I, 9; Triana in Trans. Linn. Soc. XXVIII, 152; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 552. *Kibessia cupularis*, Dcne in Delcss. Ic. Sel. V, t. 5; Ann. Sc. Nat. Ser. 3, XV, 317. *K. acuminata*, Dcne in Ann. Sc. Nat. Ser. 3, V, 316; Triana in Trans. Linn. Soc. XXVIII, 153.

MALACCA and SINGAPORE; not uncommon; many collectors.

I cannot see how *K. acuminata*, Dcne, is to be distinguished as a species and I reduce it here without any hesitation.

VAR. *pubescens*, King. Bases of leaves somewhat rounded and sub-cordate; young branches, under surfaces of leaves and panicles with much minute rusty pubescence. *P. echinata*, Jack, Wall. Cat. 4078*a*. *Kibessia pubescens*, Dcne in Ann. Sc. Nat. Ser. 3, V, 318; Triana in Linn. Trans. XXVIII, 152; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 552; Cogn. in DC. Mon. Phan. VII, 1108.

PENANG, MALACCA, PERAK.

I cannot see what claim this has to specific rank. To me it appears to be a variety and not a very distinct one of *P. echinata*, Jack. Wallich did not even regard it as a variety and issued it as true *P. echinata*. This form, in the three provinces where it occurs, appears to be very common.

3. PTERANDRA GRIFFITHII, King, n. sp. A small tree; young branches cylindric, very little thickened at the nodes, glabrous. *Leaves* thinly coriaceous, elliptic to ovate-oblong, narrowed at the non-cordate (cordate in var.) base, the apex very shortly acuminate or acute, 3-nerved; both surfaces glabrous, shining; length 2·25–4 in.; breadth 1–2 in.; petiole ·15–·2 in. *Flowers* in 2–3- rarely 5–7-flowered, axillary, bracteolate cymes shorter than the leaves, rarely in crowded, terminal cymes; bracteoles ovate, acute, minute. *Calyx-tube* widely campanulate, ·15 in. long, covered with adpressed, triangular, puberulous scales; the mouth with 4 large, blunt, triangular teeth. *Petals* orbicular-ovate, undulate, abruptly and shortly apiculate-spreading, not calyptrate. *Stamens* 8, equal; the anthers short, thick, about as long as the filaments, gibbous at the base behind, inserted at an obtuse angle on the filaments. *Fruit* globular-ovoid, truncate at the mouth, covered by the persistent scales, under ·2 in. in diam.

MALACCA; *Griffith* (K.D.) 2272/1; PENANG; *Curtis* 953.

Griffith's specimens of this (2272/1) have been referred by M. Cogniaux (DC. Mon. Phan. VII, 1110) to *Rectomitra tuberculata* Bl., but comparison in the Kew Herbarium with two authentic specimens of that plant collected in Sumatra and issued from the Leiden Herbarium shew that this differs from Blume's plant. Specimens of this were originally collected by Griffith in 1845, and as none had been gathered until Curtis's in 1886, the species is presumably a rare one.

VAR. *cordata*, King. Leaves with cordate bases.
PENANG; *Curtis* 453. PERAK; *Wray* 1994.

18. MEMECYLON, Linn.

Shrubs or *trees*, glabrous. *Leaves* opposite, short-petioled or sessile, coriaceous or sub-coriaceous, orbicular, ovate or lanceolate, entire, pinnate-nerved or rarely 3-nerved. *Flowers* usually in small, axillary, rarely terminal, simple or panicled cymes or umbels. *Calyx-tube* campanulate, glabrous; limb dilated, truncate or shortly 4-lobed. *Petals* 4, blue or white, rarely reddish. *Stamens* 8, equal, filaments long; anthers short, opening by slits in front, connective ending in a horn behind. *Ovary* inferior, 1-celled; apex glabrous, surmounted by a convex or depressed disc with 8 radiating grooves; style filiform, simple; ovules 6–12, whorled on a free-central placenta. *Berry* globose or ellipsoid, crowned with the calyx-margin, 1-seeded. *Seed* large, cotyledons convolute.—DISTRIB. Species about 130; numerous in South-East Asia and its islands; a few extending into Polynesia and Australia, several in tropical Africa.

Leaves boldly 3-nerved from base to apex ... ... 1. *M. oligoneuron.*
Leaves with pinnate nervation, sessile or subsessile:—
  Main nerves of leaves distinctly visible when dry, inter-arching but not forming (except in No. 3) a bold intra-marginal nerve; leaves thinly coriaceous or membranous, small, not exceeding 4 in. in length:—
    Young branches boldly 4-angled or winged; inflorescence very shortly stalked (the stalk not manifest):—
      Young branches 4-winged:—
        Cymes solitary, 3- or 4-flowered; leaves narrowly lanceolate, ·6 to 1 in. broad ... ... 2. *M. epiphyticum.*
        Cymes solitary, 8- to 10-flowered; leaves ovate- or oblong-lanceolate, 1·35 to 1·85 in. broad ... 3. *M. fruticosum.*
        Cymes several from the same axil, compoundly umbellate, 1·5 to 2·5 in. long, many-flowered, pubescent; leaves elliptic much narrowed to each end ... . 4. *M. pubescens.*
      Young branches 4-angled, never winged and sometimes sub-terete:—
        Cymes 3- to 5-flowered: leaves lanceolate, 1 to 2 in. broad ... ... 5. *M. dichotomum.*
    Young branches terete; inflorescence with a manifest peduncle ... ... 6. *M. Kunstleri.*

- Main nerves of leaves distinct when dry, prominent on the lower surface and anastomosing with a bold intra-marginal line, coriaceous, more than 4 in. long :—
  - Inflorescence manifestly pedunculate :—
    - Peduncles several in each axil, many-branched ; fruit ellipsoid ... ... 7. *M. caloneuron.*
    - Peduncles solitary, few-branched ; fruit globular ... 8. *M. Hullettii.*
  - Inflorescence sessile or on a very short peduncle :—
    - Flowers large, the mouth of the calyx ·2 in. in diam. :—
      - Arboreous ; leaves sub-acute ; flowers in fascicles of 12 to 20, their pedicels ·15 in. long, stout ; calyx truncate, not toothed ... ... 9. *M. Maingayi.*
      - Shrubby ; leaves acuminate ; cymes 3- or 4-flowered ; pedicels ·4 in. long, slender ; calyx-limb 4-toothed 10. *M. Kurzii.*
    - Flowers small ; mouth of the calyx under ·2 in. in diam. :—
      - Leaves slightly narrowed or rounded at the base, rarely minutely sub-cordate :—
        - Young branches not winged below the nodes ; main nerves of leaves 18 to 20 pairs ; fruit ·7 in. in diam. ... ... 11. *M. heteropleurum.*
        - Young branches with 4 short wings below each node (sometimes obscure) ; main nerves 12 to 14 pairs ; fruit ·35 in. in diam. ... ... 12. *M. costatum.*
      - Leaves distinctly cordate at the base and quite sessile, amplexicaul ... ... 13. *M. amplexicaule.*
- Main nerves of leaves indistinct on both surfaces when dry ; leaves coriaceous or thinly so :—
  - Leaves with broad cordate bases, sessile, amplexicaul :—
    - Branches terete, fruit large, globular ... ... 14. *M. microstomum.*
    - Branches 4-angled ; fruit ellipsoid ... ... 15. *M. coeruleum.*
  - Leaves much narrowed at the base, never cordate, petiolate :—
    - Inflorescence in axillary glomeruli or in very shortly-peduncled (not manifest) cymes :—
      - Mouth of calyx entire in the expanded flower :—
        - Flowers in fascicles, their pedicels slender ; leaves often 4 in. long ; leaves brown underneath when dry ... ... 16. *M. campanulatum.*
        - Flowers in short umbellate sub-sessile cymes ; young branches bi-sulcate : fruit globular ; leaves pale yellowish underneath when dry ... 17. *M. minutiflorum.*
      - Mouth of calyx 4-toothed :—
        - Teeth of calyx long, sharp, its fundus narrowed ; flower buds narrowly conical ; cymes many-flowered ; fruit globular, ·2 in. in diam. ; leaves shortly acuminate, 1·5 to 2·5 in. long ... 18. *M. myrsinoides.*
        - Teeth of calyx short, acute, its fundus narrow ; cymes few-flowered, fruit globular, ·3 in. in diam. ; leaves very acuminate, 2 to 2·5 in. long... 19. *M. laevigatum.*

Teeth of calyx short, acute, its fundus rounded; fruit globular, ·25 in. in diam.; flower pedicels with acicular bracteoles; leaves much acuminate, 2·8 to 5·5 in. long ... ... 20. *M. cinereum.*

Inflorescence manifestly pedunculate:—

Fruit ellipsoid:—

Young branches terete; calyx-limb truncate; leaves elliptic-oblong or elliptic, 2·5 to 4·75 in. long ... ... 21. *M. oleaefolium.*

Fruit globular:—

Branches 4-angled:—

Leaves rhomboid or elliptic-rhomboid; inflorescence under ·5 in. long; calyx saucer-shaped with wide, minutely 4-toothed mouth; fruit ·2 in. in diam. ... ... 22. *M. pauciflorum.*

Leaves oblong to elliptic, much tapered to each end; inflorescences 1 in. or more in length, several in each axil; calyx with narrow fundus, the mouth wide (·1 in.) and obscurely 4-toothed; fruit ·5 in. in diam. ... ... 23. *M. elegans.*

Branches terete:—

Mouth of calyx with 4 broad, shallow teeth; flowers 4 to 6 in a compound umbel; fruit ·25 in. in diam.; leaves caudate-acuminate ... 24. *M. acuminatum.*

Mouth of calyx truncate or with 4 obscure teeth:—

Cymes many-flowered, on peduncles not longer than the leaf-petioles; calyx with wide, obscurely toothed mouth and narrow, cup-shaped tube; young branches not bi-sulcate ... ... 25. *M. garcinioides.*

Cymes or peduncles very slightly if at all longer than the petioles; calyx not toothed; young branches deeply bi-sulcate under the nodes ... ... 26. *M. andamanicum.*

Cymes or peduncles several times longer than the leaf-petioles:—

Peduncles solitary; leaves thinly coriaceous ... ... 27. *M. intermedium.*

Peduncles several from the same axil; leaves coriaceous ... ... 28. *M. edule.*

1. MEMECYLON OLIGONEURON, Blume, Mus. Bot. I, 354. A small tree or shrub; young branches slender, terete, their bark pale-brown. *Leaves* thinly coriaceous, brown below, greenish brown above when dry, oblong to ovate- or elliptic-oblong, shortly and obtusely acuminate, boldly 3-nerved from the cuneate base, transverse nerves invisible; length 2–4 in.; breadth 1·3–1·65; petiole ·05–·15 in. *Flowers* small

(·05 in. long), on pedicels about ·1 in. long, densely crowded in clusters on small tubercles in the axils of leaves or of fallen leaves. *Calyx-tube* cupular, but little contracted at the base, the mouth wide with four broad shallow teeth. *Fruit* unknown. Miq. Fl. Ind. Bat. I, pt. 1, 574; Cogn. in DC. Mon. Phan. VII, 1132. *M. trinerve*, Hassk. Cat. Hort. Bog. 259 (not of DC.). *Myrtus oligoneura*, Korth. ex Blume l.c. 354.

PERAK; *Scortechini* 1309; *King's Collector* 2513, 10280. PENANG; *Curtis* 1065, 1446, 2220, 10920. DISTRIB. Java, Borneo.

A species easily recognised by its 3-nerved leaves.

2. MEMECYLON EPIPHYTICUM, King, n. sp. An epiphytic shrub; branches rather stout, strongly angled and with short ear-like projections just below the nodes. *Leaves* thinly coriaceous, narrowly oblong-lanceolate, acute or acuminate, somewhat narrowed to the rounded sub-cordate base; main nerves 9 or 10 pairs, indistinct on the lower surface, invisible on the upper; length 1·75–3 in.; breadth ·6–1 in.; petiole ·05 in. *Cymes* in pairs, axillary, 3–4-flowered, on slender pedicels ·1–·15 in. long, bracteate at the apex; pedicels half as long as the peduncle. *Calyx-tube* cupular, rounded at the base; the mouth deep and wide (·05 in. across), undulate, truncate. *Fruit* globular, smooth, ·25 in. in diam.

PERAK; on trees, *King's Collector* 5184; *Wray* 2727.

A species allied to *M. dichotomum*, Clarke, but with smaller leaves, more boldly angled branches, smaller, less numerous flowers, and cymes on more slender peduncles.

3. MEMECYLON FRUTICOSUM, King, n. sp. A shrub, 6–8 feet high; young branches boldly 4-winged especially near the slightly thickened nodes, the bark pale-brown. *Leaves* ovate-lanceolate or oblong-lanceolate, chartaceous, shortly acuminate, slightly narrowed to the rounded base; main nerves 7–9 pairs, interarching ·15 in. from the margin, somewhat conspicuous on the lower but indistinct on the upper surface; length 3–4 in.; breadth 1·35–1·85 in.; petiole ·05 in. *Cymes* usually in pairs, axillary, on short peduncles, 8–10-flowered. *Flowers* on pedicels with acute bracteoles at their bases. *Calyx-tube* shortly campanulate, tapering much to the base (obconic), the mouth ·075 in. wide, with 4 shallow obscure teeth, or truncate; the buds not very conical. *Fruit* globose-ovoid, constricted below the thick persistent calyx-limb, ·35 in. long and ·25 in. in diam. (unripe).

PERAK; *King's Collector* 2971, 3265, 3425.

Approaching *M. dichotomum* and *M. sub-dichotomum* but with differently shaped fruit.

4. MEMECYLON PUBESCENS, King. A tree, 30–70 feet high; young branches somewhat slender, pale-brown, 4-angled. *Leaves* coriaceous,

elliptic, shortly and abruptly acuminate, the base much narrowed; yellowish green on the lower surface and olivaceous on the upper when dry; main nerves 7–10 pairs, quite distinct on the lower surface, less so on the upper, curved and interarching ·1 in. from the margin. *Cymes* 1–3 from the axils of leaves, often unequal, proliferously umbellate, from 1·5–2·5 in. long, always pedunculate, the peduncle and all its branches 4-angled, bracteolate at the divisions, sparsely and deciduously rusty-pubescent. *Flowers* densely clustered at the apices of the thickened secondary peduncles, pedicellate; the pedicels with numerous sharply acuminate bracteoles at their bases. *Calyx-tube* campanulate, much narrowed at the base, the mouth rather more than ·05 in. wide, truncate but with 4 minute, acicular teeth. *Fruit* globular, ·15 in. in diam. (unripe). *M. grande*, Retz., var. *pubescens*, Clarke in Hook. fil. Fl. Br. Ind. II, 558; Cogn. in DC. Mon. Phan. VII, 1153.

MALACCA; *Griffith* (Kew Distrib.) 2336. PERAK; *King's Collector* 6089, 10760. SINGAPORE; *Ridley* 10390.

Ripe fruit of this is unknown.

5. MEMECYLON DICHOTOMUM, C. B. Clarke in Herb. Kew. A slender shrub, 6–8 feet high; young branches slender, acutely 4-angled (even 4-winged) below the slightly thickened nodes; the bark pale-brown. *Leaves* thinly coriaceous, almost sessile, lanceolate to ovate-lanceolate, much acuminate, often caudate; the base rounded or slightly narrowed; main nerves 6–8 pairs, curved, interarching rather far from the margin, often indistinct; length 2·5–4 in.; breadth 1–2 in.; petiole very short (under ·05 in.). *Cymes* 2–5-flowered, solitary, axillary and terminal; peduncles very short, 4-angled; pedicels with two ovate, acute bracteoles at their apices embracing the calyx. *Calyx-tube* campanulate, tapering to the base (obconical); minutely glandular outside when dry, the mouth with 4 broad, shallow lobes when young, truncate and almost entire when old; buds rather large, conical. *Fruit* globular, crowned by the narrow calyx-limb, smooth when ripe, about ·5 in. in diam. *M. elegans*, var. *dichotoma*, C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 554; Cogn. in DC. Mon. Phan. VII, 1138.

MALACCA; *Griffith* (Kew Distrib.) 2324; *Maingay* (K.D.) 818, 820. PERAK; *Wray* 2989; *King's Collector* 3239, 5036, 5297, 10783. PAHANG; *Ridley* 2609.

I restore for this species the MS. name originally given to it by Mr. C. B. Clarke in the Kew Herbarium. Mr. Clarke subsequently reduced it, as a variety, to *M. elegans*, Kurz, of which there were, at the time he made the reduction, no good specimens. Now that there are excellent examples of *M. elegans*, it is clear that *M. dichotomum* is not near that species.

There are specimens in the Calcutta Herbarium of what appear to be other species allied to this. But the material of all is imperfect and I describe none of them.

6. MEMECYLON KUNSTLERI, King, n. sp. A tree, 40–60 feet high; young branches slender, terete, very pale-grey. *Leaves* chartaceous, drying brown (palest on the lower surface), elliptic-oblong, bluntly acuminate, the base rounded and often minutely cordate; main nerves 7 or 8 pairs, ascending, faint on the lower and almost invisible on the upper surface when dry; length 2·75–4·5 in.; breadth 1–2 in.; petiole ·05–·1 in. *Peduncles* from the axils of fallen leaves or axillary, bracteolate, ·35–·6 in. long, umbellately panicled, bracteolate at the divisions, 4-angled like the pedicels; ultimate umbels 4–6-flowered, on the thickened ends of the secondary peduncles, pedicels bracteolate at the base. *Calyx-tube* cup-shaped, shallow, the mouth obscurely 4-toothed. Young fruit ellipsoid, crowned by the thick, shallow, obscurely 4-toothed limb of the calyx, ·3 in. long, and ·15 in. in diam.

PERAK; *King's Collector* (Kunstler) 8195, 10419.

This is known only by Mr. Kunstler's two suites of specimens. One of these sets bears no fruit; the other no flowers. The leaves on the former are rather smaller than those on the second but the venation is the same and I assume that they belong to one species. The terete branchlets, associated as they are with an inflorescence which is 4-angled in all its branches, even down to the pedicels and the ellipsoid fruit, distinguish the plant.

7. MEMECYLON CALONEURON, Miq. Fl. Ind. Bat. Suppl. 321. A tree; branchlets and leaves as in *M. costatum*, Miq., but the latter with fewer nerves. *Flowers* in axillary, pedunculate, many-branched cymes, 1–2 in. long, the flowers in dense glomeruli on the thickened apices of the ultimate branchlets; all the peduncles boldly 4-angled or winged; fruit ellipsoid, ·35 in. long (including the small persistent calyx-limb). *M. costatum*, Miq., var. *ellipsoidea*, Blume Mus. Bot. I, 361; Cogn. in DC. Mon. Phan. VII, 1136.

MALACCA; *Maingay* (Kew Distrib.) 813. PERAK; *Wray* 3235; *King's Collector* 6945, 8505. DISTRIB. Java; Sumatra, *Forbes* 2696; Borneo.

The inflorescence and fruit are so different from those of *M. costatum*, Miq., that I have followed Miquel in treating this as a species. Miquel did not however, recognise that his *M. caloneuron* really covers Blume's variety *ellipsoidea* of his own species *M. costatum*.

8. MEMECYLON HULLETTII, King, n. sp. Young branches slightly ridged near the nodes, otherwise terete, the bark pale-brown. *Leaves* chartaceous, ovate-oblong, gradually narrowed to the acuminate apex; the base broad, abruptly rounded, slightly cordate; main nerves about 15 pairs, thin but distinct on the lower surface, horizontal; length 6–8 in.; breadth 2·25–3 in.; petiole under ·1 in. *Peduncle* solitary, axillary, 1·5–2·5 in. long, slender, bearing at its apex a single or compound

few-flowered umbel; the flower-pedicels longer than the calyx and, like the peduncles of the secondary umbels, rugulose. *Calyx-tube* campanulate, narrowed to the base; the mouth truncate, with 4 very obscure shallow teeth. *Fruit* globular, crowned by the rather large calyx-limb, ·25 in. in diam. (not quite ripe).

JOHORE; on Gunong Pulai, *Hullett* and *King* 253; *Lake* and *Kelsall* 4073.

A very well-marked species near *M. amplexicaule*, Roxb., at once distinguished by its elongately acuminate, broad-based leaves and long-peduncled umbels.

9. MEMECYLON MAINGAYI, Clarke in Hook. fil. Fl. Br. Ind. II, 557. A tree, 20–40 feet high; branches stout, terete, somewhat thickened at the nodes, the bark pale-brown when dry. *Leaves* coriaceous, nearly sessile, elliptic-oblong, sub-acute, slightly narrowed to the rounded, sometimes slightly cordate base; in length 6·5–9 in.; breadth 3–4·25 in.; main nerves 12–15 pairs, not very prominent, interarching inside the margin. *Flowers* large for the genus, in few-flowered (12–20) fascicles from the axils of the leaves or of fallen leaves; peduncles and pedicels about ·15 in. long, bracteolate. *Calyx-tube* widely cupular, truncate, toothless, ·2 in. in diam. when dry. *Petals* obtuse in bud. *Fruit* unknown. Cogn. in DC. Mon. Phan. VII, 1139.

MALACCA; *Maingay* (Herb. prop.) 1422. PERAK; *King's Collector* 4726.

An arboreal species with large flowers and thick branches, allied to *M. amplexicaule* but well distinct.

10. MEMECYLON KURZII, King. A glabrous shrub; young branches terete, swollen under the nodes, the bark pale when dry. *Leaves* thinly coriaceous, sub-sessile, ovate-oblong, shortly acuminate, slightly narrowed to the rounded base; main nerves 15–20 pairs, rather straight, interarching ·25 in. from the margin, faint; length 8·5–10 in.; breadth 3·25–4·5 in.; petiole about ·1 in. long, stout. *Flowers* large, on slender bi-bracteolate pedicels ·4 in. long; the cymes 3- or 4-flowered, from the axils of fallen leaves, solitary or several together; peduncle short (only ·15 in. long). *Calyx-tube* campanulate, ·2 in. long; the mouth ·2 in. wide, wavy and with 4 broad teeth. *Fruit* ellipsoid, somewhat curved, ·75 in. in length (including the persistent limb of the calyx) and ·4 in. in diam. *M. subtrinervium*, Miq., VAR. *grandiflora*, Kurz in Journ. As. Soc. Beng. 1876, pt. II, 131; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 565; Cogn. in DC. Mon. Phan. VII, 1143.

NICOBAR ISLANDS; *Kurz*, *King's Collector* 509.

The leaves of this when dry are pale-brown on the upper and pale-olivaceous on the lower surface. They are different in shape from those of *M. subtrinervium*, Miq., of which Kurz makes this a variety. The flowers of the latter are moreover small and in slender pedunculate cymes.

11. MEMECYLON HETEROPLEURUM, Blume, Mus. Bot. Lugd. Bat. I, 362. A tree, 30 and 40 feet high; young branches rather slender, terete, the bark pale-brown or cinereous when dry. *Leaves* thinly coriaceous, broadly oblong-lanceolate or elliptic-oblong, shortly and rather bluntly acuminate, the base rounded or narrowed, not cordate, shortly petiolate, pale-brown with sometimes a touch of green on both surfaces when dry; main nerves 18–20 pairs, straight, interaching close to the margin, thin but very distinct on the lower surface when dry; length 5–7 in. rarely 10 in.; breadth 2–3·5 in.; petiole only ·1 in. *Flowers* pointed in bud, in dense cymes from the axils of the leaves or from those of the old leaves; the peduncle ·25 in. long; pedicels shorter, bi-bracteolate. *Calyx-tube* widely cupular, narrowed to the base, truncate, ·1–·15 in. in diam. when dry. *Fruit* globular, ·5 in. in diam. Miq. Fl. Ind. Bat. I, pt. I, 579; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 557; Cogn. in DC. Mon. Phan. VII, 1140.

MALACCA; *Griffith* 2337 (Kew Distrib.); *Maingay* (K.D.) 816. PENANG; *Curtis* 814. SINGAPORE and SELANGORE; *Ridley*. PERAK; *King's Collector*, *Wray*, *Scortechini*: many Nos.; common. DISTRIB. Sumatra and Borneo.

VAR. *olivacea*, King. Leaves rounded at the base, large, 10–14 in. long and 3·5–4·25 in. broad, with a strong olivaceous tint when dry: fruit not seen.

PERAK; *King's Collector* 500, 2778, 10872; *Wray* 1310.

This variety differs (as far as it is represented by dried specimens) from typical *M. heteropleurum*, Bl., only in the size of its leaves and their colour when dried; fruit of it is unknown, the flowers and shape of leaves are exactly those of the type.

12. MEMECYLON COSTATUM, Miq. in Verh. Ned. Inst. 1850, p. 29. A tree, 30–60 feet high; young branches terete, but with 4 short wings below the nodes. *Leaves* thinly coriaceous (drying pale-brown with a tinge of yellowish-green), oblong- or oblong-lanceolate, sometimes oblong-ovate, shortly acuminate, the base rounded or slightly narrowed, not cordate, penni-nerved; the main nerves 12–14 pairs, stout, curved, anastomosing at ·25 in. from the margin with a bold lateral nerve; length 4·5–7·5 in.; breadth 1·75–3 in.; petiole very short, stout. *Flowers* crowded in axillary glomeruli, 1 in. or less in diameter; their pedicels short (·1–·05 in.), the bracteoles minute, triangular. *Calyx* cup-shaped, truncate, slightly narrowed at the base. *Petals* ·2 in. in diam. *Fruit* globose, ·35 in. in diam. Miq. Fl. Ind. Bat. I, pt. I, 573; Triana in Linn. Trans. XXVIII, 157; Blume, Mus. Bot. I, 360; C. B. Clarke in Hook fil. Fl. Br. Ind. II, 558; Cogn. in DC. Mon. Phan. VIII, 1136. *M. grande*, Bl. Bijdr. 1095 (not of Retz.).

PERAK; *King's Collector* 10785. DISTRIB.; Java, Sumatra (*Forbes* 1442).

13. MEMECYLON AMPLEXICAULE, Roxb. Fl. Ind. II, 260. A shrub, 8–12 feet high; branches rather slender, terete between, but 4-angled and sometimes 4-winged below the nodes. *Leaves* (tinged with greenish-yellow when dry) sessile or nearly so, often semi-amplexicaule, ovate-oblong or ovate-lanceolate, sub-acute or shortly and bluntly acuminate, broadest a little above the cordate base, penni-nerved; the main nerves 9–12 pairs, not prominent, interaching inside the margin; length 3·5–6 in.; breadth 1–2·5 in. *Flowers* ·2 in. long, crowded in dense, axillary glomeruli 1 in. or less in diameter; their pedicels very short (lengthened to ·25 in. in fruit) and with minute bracteoles. *Calyx* campanulate, truncate, much narrowed to the base. *Petals* sub-rotund, ·2 in. in diam. *Fruit* globose, ·3 in. in diam. Wight Ic. 279. Naud. in Ann. Sc. Nat. Ser. 3, XVIII, 277; Miq. Fl. Ind. Bat. I, pt. I, 580; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 559 (in part); Cogn. in DC. Mon. Phan. VII, 1139 (in part). *M. depressum*, Benth. in Wall. Cat. 4101 (in part); Triana in Linn. Trans. XXVIII, 158 (in part). *M. cordatum*, Wall. Cat. 4100 (in part). *M. coerulum*, Triana in Linn. Trans. XXVIII, 158 (in part).

In all the Provinces except the Andaman and Nicobar Islands; common.

The petals of this are white tinged with pink. The plant described by Roxburgh under the name *M. amplexicaule* is a Malayan one, as he distintly states. The species from the South of India which has, in most of the synonyms above quoted, been treated as identical with this is, in my opinion, quite distinct. It has smaller and proportionately broader leaves, and the flowers, which are smaller and more numerous, are in fascicles from the axils of fallen leaves. This is allied to *M. costatum*, and like it, this has the stems often 4-winged below the nodes; the leaves are also sessile or nearly so, but they differ from those of *M. costatum* in invariably being cordate at the base.

14. MEMECYLON MICROSTOMUM, Clarke in Hook. fil. Fl. Br. Ind. II, 557. A tree, 40–70 feet high; branches terete, rather slender, dark greyish-brown when dry. *Leaves* very coriaceous, sessile and almost amplexicaul, oblong or narrowly elliptic, sub-acute or obtuse, the base rounded and slightly cordate, very opaque, the nerves very indistinct; length 3·25–4·5 in.; breadth 1·3–2 in. *Flowers* numerous, small, less than ·1 in long (excluding the exserted stamens), crowded in dense axillary glomeruli, pedicels filiform. *Calyx-tube* infundibuliform, constricted in its lower third, the mouth wide truncate. *Petals* pale yellowish-green. *Fruit* large (·6 in. in diam.), globular, the persistent calyx-limb small. Cogn. in DC. Mon. Phan. VII, 1147.

MALACCA; *Maingay* (Kew Distrib.) 821; PERAK; *Wray* 1137; *King's Collector* 10588. SINGAPORE; *Ridley* 2033. PENANG; *Curtis* 766.

The leaves of this, when dry, are olivaceous on the upper and pale-brown on the lower surface. The species resembles *M. amplexicaule* but differs notably in its large globular fruit.

15. MEMECYLON COERULEUM, Jack. in Mal. Misc. I, 26. A shrub, 5–15 feet high; branchlets often 4-angled near the apices, otherwise terete, slender, the bark pale-brown when dry. *Leaves* sessile, coriaceous, opaque, oblong or ovate-oblong, obtuse or sub-acute, broadest a little above the rounded, cordate base, the midrib distinct but the main nerves faint and the reticulations obsolete; length 2·5–4·75 in.; breadth 1–2·5 in. *Flowers* rather numerous, in dense, axillary, condensed glomerulate cymes, the peduncle ·25 in. long, the pedicels shorter than the flowers, each with two broad, acute bracteoles. *Calyx-tube* short, widely campanulate, narrowed to the base, the mouth wide truncate. *Petals* conical in bud. *Fruit* narrowly ellipsoid, ·4 in. long and ·25 in. in diam. (including the deep, persistent calyx-limb). Miq. Fl. Ind. Bat. I, pt. I, 580; Triana in Linn. Trans. XXVIII, 158 (excl. syn. *M. amplexicaule*, Roxb.); Kurz, For. Flora B. Burma I, 511; C. B. Clarke in Hook. fil. Fl. Br. Ind. I, 559; Cogn. in DC. Mon. Phan. VII, 1163. *M. grande*, Smith in Rees' Cyc. XXIII (not of Retz). *M. cordatum*, Wall. Cat. 4100 (partly); Griff. Not. IV, 673. *M. manillanum*, Naud. in Ann. Sc. Nat., Ser. 3, XVIII, 276; Miq. l.c. 576. *M. lutescens*, Presl. Epim. Bot. 208 (not of Naud.).

In all the provinces; not uncommon. DISTRIB. Philippines.

16. MEMECYLON CAMPANULATUM, Clarke in Hook. fil. Fl. Br. Ind. II, 563. Young branches rather slender, terete, their bark pale-brown. *Leaves* coriaceous, elliptic, sometimes with a short blunt apical point, the base always much and abruptly narrowed, nerves invisible; length 3–4·5 in.; breadth 1·25–2·2 in.; petiole ·1–·15 in. *Flowers* on slender pedicels, ·1–·15 in. long, bracteolate at the base and crowded in dense fascicles in the axils of the leaves or of the fallen leaves, the buds of the petals shortly conical. *Calyx-tube* campanulate, blunt at the base and somewhat contracted below the wide truncate limb. *Fruit* unknown. Cogn. in DC. Mon. Phan. VII, 1162.

MALACCA; *Griffith* (Kew Distrib. 2325).

In its leaves this much resembles *M. oleafolium*, Bl., but the flowers of that species are in lax, few-flowered, pedunculate umbels, whereas the flowers of this are in dense, epedunculate fascicles.

17. MEMECYLON MINUTIFLORUM, Miq. Fl. Ind. Bat. Suppl., 323. A tree, 30–70 feet high; young branches slender, with a broad, angularly margined groove on each side; the bark pale, smooth. *Leaves* thinly coriaceous, drying yellowish-green beneath, narrowly elliptic, cordate-acuminate, the base much narrowed; main nerves very indistinct.

Inflorescence twice as long as the petioles, many-flowered; the peduncles often two or three from the same axil, each bearing several 2–4-flowered umbels; pedicels stout, bracteolate at the base. *Calyx-tube* cup-shaped, not tapered to the base, the mouth expanded, truncate and ·05 in. wide, glandular-hairy when young like the bluntly conical petal-bud and the pedicels. *Fruit* crowned by the minute calyx-limb, depressed globular, smooth, ·35 in. in diam. and ·3 in. deep. Cogn. in DC. Mon. Phan. VII, 1169. *M. acuminatum*, Sm., VAR. *flavescens*, Clarke in Hook. fil. Fl. Br. Ind. II, 562; Cogn. in DC. Mon. Phan. VII, 1152.

MALACCA; *Griffith* (Kew Distrib.) 2325/2. PENANG; *Curtis* 815. PERAK; *King's Collector* 5027, 6105, 6265, 8724. DISTRIB. Sumatra.

Triana considers this a distinct species and I think he is right. *Fruit* however is wanting to complete our knowledge of the form. The Perak specimens agree perfectly with the type sheet named *M. minutiflorum*, Miq., in Herb. Calcutta. The species is not, as was suggested by Kurz, identical with *M. lilacinum*, Zoll. and Moritzi.

18. MEMECYLON MYRSINOIDES, Blume, Mus. Bot. I, 356. A tree, 30–40 feet high (rarely a shrub); young branches terete, slender, with pale-grey bark. *Leaves* thinly coriaceous, drying brown (palest on the lower surface), narrowly elliptic or ovate-lanceolate, the apex very acuminate, much narrowed to the cuneate base; main nerves invisible on both surfaces; length 1·5–2·5 in.; breadth ·9–1·25 in.; petiole ·15–·25 in. *Flowers* numerous, in very short-peduncled cymes, densely clustered together in the same axil; pedicels about the length of the calyx, bracteolate at the base. *Calyx-tube* campanulate, much narrowed to the base, the mouth less than ·05 in. wide, with 4 long (for the genus) acute teeth; *petals* in bud forming a long narrow cone, acuminate. *Fruit* globular, the size of a grain of black pepper. Miq. Fl. Ind. Bat. I, pt. I, 577; Triana in Linn. Trans. XXVIII, 158 (excl. syn.); Cogn. in DC. Mon. Phan. VII, 1160; excl. syn. *M. lilacinum*. *M. capitellatum*, Blume, Bijdr. 1091 (not of Linn.).

PENANG; *Curtis* 2219. JOHORE; *Ridley* 2026. PERAK; *Wray* 2258; *King's Collector* 1851, 3517, 5923, 8828. DISTRIB.; Sumatra; *Forbes* 2953; Java; Bangka.

VAR. *lilacina*, King. Young branches with two deep, sharply-margined grooves; leaves broadly elliptic, yellowish on the under surface when dry, cymes not crowded (only two in an axil). *M. lilacinum*, Zoll. & Mor. Syst. Verzeich., 9; Naud. in Ann. Sc. Nat. Ser. 3, XVIII, 281; Miq. Fl. Ind. Bat. I, pt. 1, 575.

PENANG; *King's Collector* 1457; *Curtis* 100. SINGAPORE; *Ridley* 6218. PERAK; *King's Collector* 10442. DISTRIB.; Java, *Zollinger* 178.

19. **Memecylon laevigatum**, Blume, Mus. Bot. Lugd. Bat. I, 358. A small tree; young branches very slender, terete, the bark pale. *Leaves* thinly coriaceous, broadly ovate or elliptic, more or less rostrate-acuminate, the base cuneate; main nerves obscure; length 2–2·5 in.; breadth 1–1·75 in., petiole ·1–·15 in., opaque, when dry dull dark-brown, the lower surface slightly paler than the upper. *Cymes* mostly from the nodes of fallen leaves, small, few-flowered, the peduncle very short (·1 in. long), pedicels also very short. *Flowers* small (less than ·1 in. long), their buds pointed; *calyx-tube* campanulate, much tapered to the base, the mouth with 4 acute, small teeth. *Fruit* globular, ·3 in. in diam., smooth. Miq. Fl. Ind. Bat. I, pt. I, 576; Triana in Linn. Trans. XXVIII, 157; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 561 (excl. VARS.); Kurz, For. Flora. I, 513; Cogn. in DC. Mon. Phan. VII, 1159. *M. Myrilli*, Blume, Mus. Bot., 357; Miq. l.c. 578. *M. pachyderma*, Wall. Cat. 4104. *M. Vosmaerianum*, Scheff. in Flora, 1870, 249.

MALACCA; *Ridley* 1767. SINGAPORE; *Ridley* 1815, 1906, 2026, 4805. PERAK; *Scortechini* 81; *Wray* 2091; *King's Collector* 3768. SELANGORE; *Ridley* 2024. DISTRIB.; Burma, *Helfer* 2328; *Wallich* 4104; Bangka, Java, Borneo.

20. **Memecylon cinereum**, King, n. sp. A shrub; young branches rather slender, terete, sulcate on two sides, the bark dark-cinereous when dry. *Leaves* coriaceous, drying very dark cinereous-brown on the upper surface, somewhat paler on the lower, lanceolate or ovate-lanceolate, much acuminate, the base rounded but more often cuneate; main nerves 8–10 pairs, invisible on both surfaces or nearly so, length 2·8–5·5 in.; breadth 1–2·2 in.; petiole ·15–·3 in. *Peduncles* axillary or from the leafless nodes, not much longer than the petioles, glomerulate, many-flowered; pedicels short, stout, with small acicular bracteoles at the base. *Calyx-tube* cupular, with a rounded base; the mouth expanded, ·1 in. wide, undulate and with 4 acute, triangular teeth. *Fruit* globular, the persistent calyx-limb small, ·25 in. in diam., smooth.

PERAK; *Scortechini* 394, 2035; *King's Collector* 3143, 10758.

21. **Memecylon oleaefolium**, Blume, Mus. Bot. I, 359. A tree, 30–60 feet high; young branches rather slender, terete, smooth, the bark very pale. *Leaves* coriaceous, elliptic-oblong or elliptic, the apex obtusely acuminate, the base much narrowed, when dry of a pale olivaceous-brown colour on both surfaces, the upper the darker; main nerves 8–10 pairs, obscure; length 2·5–4·75 in.; breadth 1–2·25 in.; petioles ·15 to ·3 in. *Peduncles* 1–3 in one leaf-axil, several times longer than the petiole (elongating in fruit), bearing at the apex

numerous, crowded, 2–3-flowered umbellules with a semi-circular bract at the bases of their short, stout, 4-angled peduncles. *Flowers* with conical buds, less than ·1 in. in diam., on slender pedicels longer than themselves, bracteolate at their bases. *Calyx* hemispheric; the mouth truncate, entire. *Fruit* ovoid-elliptic, crowned by the short calyx-limb, ·4 long and ·25 in. in diam. Miq. Fl. Ind. Bat. I, pt. I, 579 (excl. syn.); Cogn. in DC. Mon. Phan. VII, 1150. *M. Horsfieldii*, Miq. Fl. Ind. Bat. I, pt. I, 572. *M. grande*, Retz, VAR. *Horsfieldii*, Clarke in Hook. fil. Fl. Br. Ind. II, 558; Cogn. in DC. Mon. Phan. VII, 1153 (excl. syn. *M. celastrinum*, Kurz from both). *M. lampongum*, Miq. Fl. Ind. Bat. Suppl. 321.

MALACCA; *Maingay* (Kew Distrib.) 811. SINGAPORE; *Ridley* 6414. PERAK; *Scortechini* 2069; *King's Collector* 426, 5187, 4420, 4439, 8571. DISTRIB. Bangka; *Horsfield;* Sumatra; *Forbes* 3213.

This has been treated by Messrs. Clarke and Cogniaux as a variety of *M. grande* of Retz, a species originally described by its author from specimens sent to him by Koenig, who collected in Southern India. Retz's description is very short and, as Mr. Clarke points out, would suit several species. The species of *Memecylon* have not, as a rule, a wide distribution, and very few indeed of them are common to S. India or Ceylon and to the Malay Peninsula. I think it, therefore, in the absence of his type specimen, advisable to consider Retz's name as properly belonging to the Ceylon plant represented by Thwaites's C.P. 3442. Both Messrs. Clarke and Cogniaux treat as belonging to typical *M. grande*, Retz, the Singapore plant issued by Wallich as No. 4472 of his Catalogue under the name *M. laxiflorum*. This plant is now represented only by fruiting specimens which do not, in my opinion agree with any other *Memecylon* in Herb. Kew. The inflorescence in Wallich's specimens is 2·5 in. long, pedunculate, and laxly compound-umbellate. When flowers shall be forthcoming it will probably be found necessary to let the species *M. laxiflorum* stand good.

Thwaites's C.P. which I assume, in the absence of a type specimen, to be equal to the type of *M. grande*, Retz, does not in my opinion resemble the four forms which the two distinguished botanists just mentioned agree in treating as varieties of it, sufficiently closely to warrant such treatment of the latter. I would venture to dispose of them as follows:—

VAR. Horsfieldii = M. oleaefolium, *Bl.* VAR. khasiana = M. celastrinum, *Kurz.*
VAR. pubescens = M. pubescens, *King.* VAR. merguica = M. merguica, *King.*

M. Cogniaux has inadvertently described the fruit of *M. oleaefolium* as globose, whereas in his original description of it Blume writes "*fructibus ellipsoideis.*"

22. MEMECYLON PAUCIFLORUM, Blume, Mus. Bot. I, 356. A small tree; young branches 4-angled, slender, pale-brown. *Leaves* coriaceous, rhomboid or elliptic-rhomboid, drying brown, the lower surface paler, the apex blunt and often retuse, the base acute or subacute; nerves 6 or 7 pairs, invisible or very faint; length 1–1·5 in.; breadth ·35–1 in.; petiole under ·1 in. *Cymes* umbellate, axillary, on slender peduncles ·1–·2 in. long; flowers 7–10, small, on slender pedicels bracteolate at the base

and about ·15 in. long. *Calyx-tube* shortly campanulate, or saucer-shaped, with a large, wide, sharply and minutely 4-toothed mouth. *Petals* acuminate. *Stamens* and style much exserted. *Fruit* depressed-globular, smooth, crowned by the toothed calyx, ·2 in. in diam. Miq. Fl. Ind. Bat. I, pt. I, 578; Kurz, For. Flora Burma I, 514; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 555; Cogn. in DC. Mon. Phan. VII, 1169. *M. capitellatum*, Spanoghe in Linnaea, XV, 203 (not of Linn.). *M. umbellatum*, Benth. Fl. Austral III, 293 (non Burm.). *M. australe*, Muell. ex Triana in Linn. Trans. XXVIII, 159.

Andaman Islands; very common. Distrib. Burma (*Helfer* 2332); Chittagong; Australia; Timor.

The Penang specimens have narrower, less rhomboid leaves than those from the Andamans.

23. Memecylon elegans, Kurz in Journ. As. Soc. Beng. 1872, pt. II, 307. A glabrous shrub; young branches slender, boldly 4-angled, sometimes winged, the bark pale. *Leaves* coriaceous, pale yellowish, the upper surface tinged with green when dry, oblong to elliptic, much acuminate, the base very cuneate; main nerves invisible or very indistinct; length 3·5–5·5 in.; breadth 1·4–2 in.; petiole ·15–·3. *Flowers* ·15 in. long, their pedicels longer, (·2 in.), slender, angled. *Cymes* axillary, several together, pedunculate, simply or trichotomously umbellulate; peduncles ·3–·75 in. long, 4-angled. *Calyx-tube* somewhat large for the genus, cup-shaped, narrowed to the base, ·1 in. wide at the undulate, obscurely 4-lobed mouth. *Petals* blue, broadly ovate, acuminate. *Fruit* globular, smooth, ·5 in. in diam. Kurz, For. Flor. Burma I, 514; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 554; Cogn. in DC. Mon. Phan. VII, 1138.

Andaman Islands; very common.

Var. *minor*, King. *Cymes* usually solitary, the pedicel slender, short; fruit only ·2 in. in diam. (? ripe); leaves 2–3 in. long.

Andamans; *King's Collectors.*

Smaller than the typical form in all its parts. The flower buds also differ somewhat from those of the typical form.

24. Memecylon acuminatum, Smith in Rees Cyclop. XXIII, 4. A tree, 30–50 feet high; young branches slender, terete, the bark brown, smooth. *Leaves* thinly coriaceous, drying pale olivaceous-brown, the surfaces concolourous, ovate to ovate-lanceolate, caudate-acuminate, the base cuneate; main nerves invisible; length 1·5–2·25 in.; breadth ·8–1·4 in.; petiole ·1–·15 in. *Cymes* solitary or in pairs, axillary, umbellate, on peduncles several times longer than the petioles. *Flowers* 6–8 in a compound umbel; pedicels bracteolate at the base, slender,

twice as long as the flowers. *Calyx-tube* cup-shaped, the fundus broad, slightly constricted below the thick, short, undulate, broadly 4-toothed limb. *Petals* conical in bud. *Fruit* globular, somewhat depressed, smooth, crowned by the narrow calyx-limb, ·25 in. in diam. Triana in Trans. Linn. Soc. XXVIII, 158; DC. Prodr. III, 6; Clarke in Hook. fil. Fl. Br. Ind. II, 562; Cogn. in DC. Mon. Phan. VII, 1152 (excl. var. *flavescens*).

Malacca; *Griffith* (Kew Distrib.) 2325; *Maingay* 810; *Derry* 1041; *Ridley* 3297, 3298, 4574. Johore; *Ridley* 4656. Perak; *King's Collector* 3458, 6754.

25. Memecylon garcinioides, Blume, Mus. Bot. I, 358 (excl. var. B). A tree, 20–40 feet high; young branches terete, slender, pale-brown. *Leaves* thinly coriaceous, oblong-ovate or elliptic, abruptly and rather obtusely acuminate, the base cuneate, drying pale-brown tinged with olive, the under surface the palest; main nerves invisible; length 3–5·5 in., breadth 1·2–2 in.; petiole ·05–·1 in. *Cymes* axillary and in the axils of old leaves, umbellate, many-flowered, on short peduncles (·2 in. long, longer in fruit); pedicels slender, bracteolate at the base, ·1–·15 in. long. Flower-buds acute. *Calyx-tube* small and cup-shaped, the mouth very wide (nearly ·1 in.), truncate, but with four minute, acute teeth. *Fruit* globular, smooth, pale when dry, ·2 in. in diam. Cogn. in DC. Mon. Phan. VII, 1152.

Malacca; *Derry* 1240. *Maingay* (Kew Distrib.) 817. Perak; *Scortechini* 2033; *Wray* 2961, 3203; *King's Collector* 1984, 2938, 7123, 10034; Singapore; *Ridley* 8118. Selangore; *Ridley* 7333. Distrib. Sumatra, *Blume*, *Forbes* 2970, 3108; Borneo, *Beccari* 536.

26. Memecylon andamanicum, King, n. sp. A shrub; young branches slender with faint grooves below the nodes, the bark pale-brown. *Leaves* chartaceous, brown on the upper and greenish-yellow on the lower surface when dry, oblong-lanceolate, gradually and bluntly acuminate, the base cuneate; main nerves 10–12 pairs, interarching near the edge, sub-horizontal; length 2·25–3 in.; breadth ·75–1 in.; petiole ·25–·3 in. *Peduncles* unequal, ·2–·4 in. long, in pairs in the axils of leaves or of fallen leaves, bearing at their apices several 3–5-flowered umbels, bracteolate at the divisions, flower-pedicels as long as the calyx, minutely bracteolate at the base. *Calyx-tube* campanulate, tapered below, the mouth truncate, nearly ·2 in. wide. Bud of petals conical. *Fruit* depressed-globular, crowned by the small calyx-limb, yellowish, ·2 in. in diam.

Andaman Islands; *King's Collectors*, 357, 452. Nicobar Islands.

A species with leaves somewhat like those of *M. garcinioides*, Bl., but narrower. In its inflorescence it resembles *M. acuminatum*, Sm., but the peduncles are longer than in that species. The inflorescence also resembles that of *M. intermedium*, Bl., but when young it is covered with a yellow waxy coat; the pedicels and peduncles are moreover much shorter than in *M. intermedium*. The leaves resemble those of the latter species in shape but are of a thinner texture so that the nerves are visible though faint.

27. MEMECYLON INTERMEDIUM, Blume, Mus. Bot. I, 358. A tree, 20–40 feet high; young branches slender, terete, pale cinereous. *Leaves* thinly coriaceous, broadly ovate, shortly and bluntly acuminate, the base cuneate, greenish above and brown beneath when dry; main nerves invisible or nearly so; length 2·75–3·5 in.; breadth 1·25–2 in.; petiole ·25–·35 in. *Cymes* large, crowded, in the axils of leaves or of fallen leaves, usually in pairs, on peduncles several times longer than the petioles, compoundly umbellate; pedicels slender, bracteolate at the base, ·1 in. long. *Calyx-tube* cup-shaped, with a wide, truncate, edentate or minutely toothed limb. *Fruit* not seen (globose *fide* Cogniaux). Triana in Linn. Trans. XXVIII, 157; C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 561; Cogn. in DC. Mon. Phan. VII, 1158. *M. umbellatum*, Blume, Bijdr. 1094 (not of Burm.) Naud. in Ann. Sc. Nat. Ser. 3, XVIII, 273; Miq. Fl. Ind. Bat. I, pt. I, 575. *M. garcinioides*, Bl., VAR. *elongatum*, Blume, Mus. Bot. I, 358.

PERAK; *Scortechini* 1036. DISTRIB. Sumatra; Java.

This resembles *M. garcinioides*, Bl., very closely, but differs in inflorescence, the cymes of this being larger, on longer peduncles.

28. MEMECYLON EDULE, Roxb., Corom. Plants I, t. 82. A shrub or small tree; young branches terete, pale when dry. *Leaves* coriaceous, drying brown, the lower surface paler, both often with an olivaceous tinge, elliptic or ovate, the apex sub-acute or shortly and bluntly acuminate, the base usually cuneate but sometimes rounded; main nerves 5–8 pairs, very inconspicuous, ascending; length 2–4 in.; breadth ·85–2·25 in.; petiole ·1–·35 in. *Peduncles* several together, unequal in length, longer than the petioles, axillary, umbellately cymose, many-flowered; pedicels longer than the calyx. *Calyx-tube* cupular, narrowed to the base, the limb truncate, sometimes obscurely 4-toothed. *Fruit* globular, crowned by the small calyx-limb, ·25 in. in diam.

Only two of the numerous varieties of this species occur in our region. These are as follows:—

VAR. 1. *typica.* Leaves usually under 3 in. long, dull, tinged with yellow when dry, acute or obtuse. *M. edule*, Roxb. Fl. Ind. II, 260; DC. Prodr. III, 6; Wall. Cat. 4107; Dalz. & Gibs. Bomb. Fl. 93; Kurz, For. Fl. I, 512. *M. edule*, VAR. *a*, Thwaites Enum. 111. *M. umbellatum*, Burm. Fl. Zeyl. t. 31. *M. tinctorium*, Kœn. ex W. & A. Prodr. 319; Wight Ill. t. 31. *M. globiferum*, Wall. Cat. 4108. *M. pyrifolium*, Naud. in Ann. Sc. Nat. Ser. 3, XVIII, 277.

SINGAPORE; *Ridley* 4084, 6054. MALACCA; *Griffith* (Kew Distrib.) 2327; *Maingay* (K.D.) 812; *Derry* 1028. KEDAH; *Ridley* 2627, *Curtis* 2627. DISTRIB. India, Ceylon.

VAR. 2. *ovata*, C. B. Clarke in Hook. fil. Fl. Br. Ind. II, 563. Leaves large, often 4–4·5 in. long, acute or acuminate at the apex, the base rounded or cuneate, shining when dry; fruit black when ripe and somewhat succulent. *M. ovatum*, Sm. ex Kurz, For. Fl. I, 512. *M. edule*, VAR. γ, Thwaites Enum. 110. *M. umbellatum*, Hb. Heyne in Wall. Cat. 4109. *M. tinctorium*, VAR. β, W. & A. Prodr. 319. *M. prasinum*, Naud. in Ann. Sc. Nat. Ser. 3, XVIII, 275. *M. grande*, Wall. Cat. 4103, partly. *M. lucidum* and *M. pyrifolium*, Presl. Epim. Bot. 209, 210.

ANDAMAN ISLANDS; not common. NARCONDAM and GREAT COCO ISLANDS; *Prain*. PERAK; *King's Collector* 4175; *Scortechini* 917. PENANG; *Curtis* 723. SINGAPORE; *Ridley* 6532. DISTRIB. India, Malayan Archipelago.

DOUBTFUL SPECIES.

M. amabile, Bedd. VAR. *malaccensis*, Clarke in Fl. Br. Ind. II, 555. This is founded by its author on the very imperfect material afforded by Maingay's specimens (Kew Distrib. 819).

M. laxiflorum, Wall. Cat.; see note under *M. oleaefolium*, Blume.

Under orders of the Council the following system of transliteration will be adopted for the future in all publications of the Society. Authors of papers for the *Journal*, Pt. I, are particularly requested to adhere to it in their contributions.

A. FOR THE DĒVANĀGARĪ ALPHABET, AND FOR ALL ALPHABETS RELATED TO IT.

अ *a*, आ *ā*, इ *i*, ई *ī*, उ *u*, ऊ *ū*, ऋ *ṛ*, ॠ *ṝ*, ऌ *ḷ*, ऎ *e*, ए *ē*,
ऒ *o*, ओ *ō*, ऐ *ai*, औ *au*, ं *ṁ*, ँ ˜ : *ḥ*

क *k*,	ख *kh*,	ग *g*,	घ *gh*,	ङ *ṅ*
च *c*,	छ *ch*,	ज *j*,	झ *jh*,	ञ *ñ*
ट *ṭ*,	ठ *ṭh*,	ड *ḍ*.	ढ *ḍh*,	ण *ṇ*
त *t*,	थ *th*,	द *d*.	ध *dh*,	न *n*
प *p*,	फ *ph*.	ब *b*,	भ *bh*,	म *m*
य *y*,	र *r*,	ल *l*,	व *v*,	(ळ *ḷ*)
श *ç*,	ष *ṣ*,	स *s*,	ह *h*.	

In the above the *virāma* has been omitted for the sake of clearness.

In Modern Vernaculars only; ड़ may be represented by *ṛ*, and ढ़ by *ṛh*.

Avagraha is to be represented by an apostrophe, thus सो ऽपि *sō 'pi*. *Visarga* is represented by *ḥ*, *Jihvāmūlīya* by *ẖ*, and *Upadhmānīya* by *ḫ*. *Anusvāra* is represented by *ṁ*, thus संसर्ग *saṁsarga*, and *anunāsika* by the sign ˜ over the letter nasalized, thus अँ *ã*, आँ *ā̃*, and so on. The *udātta* accent is represented by the sign ´ and the *svarita* by ˆ. Thus, अग्निः *agníḥ*, जनिता *janitā́*, क्वा *kvâ*, कन्या *kanyā̂*. The *anudātta* accent may be represented by ˋ. Thus, ते अवर्धन्त *tè àvardhanta*.

B. FOR PERSIAN (INCLUDING ARABIC WORDS IN PERSIAN) AND HINDŪSTĀNĪ.

(The system is not applicable to Arabic when pronounced as in Arabic-speaking countries) :—

Vowels.		Consonants.		Sounds only found in Hindūstānī.	
اَ	a	ب	b	بھ	bh
آ	ā	پ	p	پھ	ph
اِ	i	ت	t	تھ	th
اِی	ī			ٹ	ṭ
اے	ē			ٹھ	ṭh
اُ	u	ث	s		
اُو	ū	ج	j	جھ	jh
او	ō	چ	c	چھ	ch

Vowels.		Consonants.		Sounds only found in Hindūstānī.	
اَیْ	ai	ح	ḥ		
اَوْ	au	خ	k͟h		
		د	d	دھ	dh
				ڈ	ḍ
				ڈھ	ḍh
		ذ	z		
		ر	r	ڑ	ṛ
				ڑھ	ṛh
		ز	z		
		ژ	z͟h		
		س	s		
		ش	s͟h		
		ص	ṣ		
		ض	ẓ		
		ط	t̤		
		ظ	z̤		
		ع	ʻ		
		غ	g͟h		
		ف	f		
		ق	q		
		ک	k	کھ	kh
		گ	g	گھ	gh
		ل	l		
		م	m		
		ن	n		
		ں	when representing *anunāsika* in Dēva Nāgarī, by ˜ on the preceding vowel		
		و	w (or rarely v)		
		ه	h		
		ی	y		
		Hamzah ء	(where necessary) ʼ		

The ل of the article ال in Arabic words should be assimilated before the solar letters; and the vowel *u* which often precedes the article and absorbs its vowel should remain attached to the word to which it belongs. Thus—اقبال الدولة Iqbālu-d-daulah.

Tanwīn may be rendered by n̲—e. g., *ittifāqan̲*. *Alif-i maqṣūraẖ* should be rendered by ạ̄.

Final ة need not be written in Persian and Hindūstānī words, but should be written in Arabic words.

JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

Part I.—HISTORY, LITERATURE, &c.

No. I.—1900.

Jangnāmah of Farrukhsiyar and Jahāndār Shāh, a Hindī poem by Çrīdhar (Murlīdhar) Brahman, of Prāg.—*By* WILLIAM IRVINE, *late of the Bengal Civil Service.*

[Read April, 1899.]

The following long poem of 1630 lines, on the above subject, was lately traced for me by Maulvi 'Abdu-l-'azīz of Bhitrī, through a native of the same place now resident in Benares, Bābū Rādhā Kiṣṇ Dās. It was found in the library of the late Bābū Hariṣ Cand of Maḥallah Caukhambah in the city of Benares. For this gentleman see No. 581 of Grierson's "Modern Vernacular Literature of Hindūstān," (1889). After four months' efforts permission to make a copy was obtained through the influence of C. L. M. Eales, Esq., C.S., District and Sessions Judge, to whom I am much indebted. A Hindi copy was made for me by the Judge's Registration Muharrir in his leisure hours, and one in the Persian character by M. 'Abdu-l-'azīz.

The work is so long as to debar its reproduction in full, nor is it throughout of equal interest. While he is expatiating at more or less length on the heroic virtues of the nobles and officers who have gathered round Farrukhsiyar's standard, the poet allows his narrative to stand still; and as a consequence, in spite of the copious vocabulary at his command, he repeats himself considerably, and the epithets soon begin to recur with "damnable iteration." I therefore propose to submit to the Society no more than extracts (680 lines in all) giving the narrative, and including at least one specimen of each kind of verse. For the rest I append an alphabetical index of the persons, tribes and places introduced.

There are a few, though not many, unhistorical statements. For instance, (lines 31, 32.) 'Abdullāh Khān is made out to have been at Paṭnah when he was really at Allāhābād; in lines 39–42 Mīr Jumlah's asserted opposition to Jahāndār Shāh is pure myth; and the dates in lines 883–886 are hopelessly wrong. On the other hand, some of the details as to localities add to our previous knowledge, and the copious use of actual names shows, to my mind, that the author either was present in the army or wrote immediately afterwards.

In several instances the introduction of tribal names is not only ingenious but effective. Here is one example:

l. 1133. *Rajpūt sohāç sāje āe, Hāḍā, Gaur, Sombaṁsī*
Cauṁhān, Caṁdeṁle, Bais, Baghele, Gaharwār au Raghubaṁsī
Kachwāha, Sulaṁkī, Haihayabaṁsī, Sirnete, Parihāraṁsī,
Gaṁdharb Siṁh Rājā sajyo, dal, Buṁdelo, Sūrajbaṁsī.

The kinds of verse used are thirteen in number and are as follows, stated in their order of frequency. *Kabit*, lines 1109–1248, 1465–1576, 1579–1630 (304 lines), *Bilās Chand*, 895–1108 (214), *Pādānkul Chand* 171–376 (206), *Gītā Chand*, 695–894 (200), *Hāri Gītā Chand*, 1309–1464 (156) *Madhubhār Chand*, 423–548 (126), *Doharā*, 1–20, 39–70, 389–422, 637–656 (108), *Harī Gītā*, 71-170 (100), *Bhujang Prayāt Chand*, 549–636, (88), *Hīrā Chand*, 1249–1308 (60), *Ardhik Chand*, 657–694 (38), *Tomar Chand*, 21–38 (18) *Chappai Chand*, 377–388, (12), total 1630 lines. As there seems some irregularity or oversight in the numbering of the stanzas, I have substituted an enumeration by lines.

On the evidence of the work now brought forward, two emendations may be suggested in the work by Mr. Grierson above referred to. First, the entries No. 156 (Murlīdhar) and No. 157 (Çrīdhar) on p. 65 may be united into one of Çrīdhar *alias* Murlīdhar. Secondly, the date assigned to him, 1683 A.D., may be made at least thirty years later, for the present work, at the very earliest, belongs to 1713 A.D.

In the pursuit of meanings, sometimes hard to catch, I have treated the poet's spelling with scant respect, making aspirated and unaspirated, dental and cerebral letters, *l*'s and *r*'s, freely interchangeable. I have, in fact, chosen "whatever suits the line."

Since I began this paper, I have received a second poem by the same poet, a sort of supplement or continuation of the *Jang-nāmah.* It is on 133 folios, and at a rough computation reaches 3560 lines in length. As it is made up of nothing but laudatory stanzas on various nobles, I shall content myself with stating the headings into which it is divided :—

fol. 1a.	Ratan Caud ke Kabita	verses	15
3b.	Rāo Ras ke Kabita, Phulwārī barnan,	,,	9
5a.	Kabita Bahādur Jī ke, Phāg barnan	,,	12
9b.	Māhārājā Chabīle Rām ke Kabita	,,	18
11a.	Mīr Mushrif ke Kabita	,,	11
13a.	Rājā Jaswant ke Kabita	,,	5
16a.	Kabita Sher Muḥammad	,,	30
20b. 26b.	Kabita Mahārājā Chabīle Rām ke Quṭbu-l-mulk Ḥasan 'Alī Khān	,,	36
27b.	Ḥusain 'Alī Khān ke Kabita	,,	43
48	[No heading]	,,	167
71b.	Kabita Muṣliḥ Khān ke	,,	100
82	[No heading]	,,	100
95a.	[Doharā—No heading]	,,	88
104a.	Çrī Rām Jī	,,	100
116a.	[No heading]	,,	51
123a.	[No heading—Stanzas 37-52 wanting]	,,	84
132b.	[No heading]	,,	2
		Total verses	871

After looking through this portentous production, one feels appalled at the enormous facility with which Hindī verse can be written.

दोहरा ।

श्रीधर मुरलीधर उरफ द्विजवर वसत प्रयाग ।
रुचिर कथा यह आदि की वर्ण्यो कथन अनुराग ॥
फरुकसियर से आदि को वरनौ प्रवल प्रवंध ।
अरु करतूतैं सवन की जे अमीर समकंध ॥
चौठी चली महाजनी भई एका एक चाह ।
छांड़ि देहँ सुरलोक को गए बहादुर शाह ॥

सुनी षवरि एकवारगी फरुकसियर उदार ।
राषि फौज एकंलगारह्वीं चलिये यहै विचार ॥
वकसी आजम खान को कीन्हो हुकुम बोलाइ ।
फौज राषिये जाय अब जेतौ राषौ जाइ ॥
फेरि षवरि दिन दसक में सांचौ पहुचौ आइ ।
जुलुफिकार उमराउ सब मिले मौजदिहि जाइ ॥
जुलुफिकार षां फोरि सब फौज दगा किय संग ।
नातरु वैसे वलिन्ह सो को जीतत सफ जंग ॥
मौजदीन सिर छत्र धरी कुतुवा कुटिल पठाइ ।
चल्यो दिल्ली को चहुं दिसां लिषि फरमान पढ़ाइ ॥

तोमर छंद ।

यह षवरि पहुंचा तत्थ
तब फरुकसियर समत्थ
सिगरे बोलाइ अमीर
सब सो कृपा करि बीर
सब सो दियो फरमाइ
अब फौज राषहु जाइ
यह हुकुम करि सुभ वषत
धरि छत्र वैठो तषत
सब शाहि के दिलसोज
तब लगे राषन फौज
सजि अवदुल्लह षान
किय प्रथम कोपि पायान
हुव शाहि को इरशाद
पहुंचो इलाहावाद
सूवा व भै सरकार
सब कियो अमल उदार
इनवां कुरावल वान
करि रह्यो कायम थान ॥

दोहरा ।

तह मीर जुमिला बीर बुद्धि गंभीर बाहु विसाल ।
मड़ि रह्यौ मौज्जुद्दीन की कटक गहि करवाल ।
सूबा सबै मनसूब बाजवि डारी चाल ।
अरु शाहि की सिंगरी हकीकति लिषत तब तत काल ॥
तब मीर जुमिला बीर अरज लिख्यौ सुपत्र उदार
इन सैद राजे षान कीनो प्राग सूबेदार
वह चल्यौ साजि हिरौल अगे सैद अबुलगफार
पीछे पठायो महादलु दै एजदीन कुमार ॥
यह मीर जुमिला बीर सब अरज पहुंची तथ्य
शाहनशाह जहां पनाह सु फरुकसियर समत्थ
सुनिकै अमीरन ओर हेरो कोपि कै समरत्थ
बोल्यौ हुसेन अलीय खां रनवां कुरा गजहत्थ ॥
एकबाल शाहनशाह को इस में न आन की आन
उन को अकेलोवै सैयद अबदुल्लह षान
तिन को क्रिपा करि वेग सो लिष भेजियो फरमान
वह मारि फौज विदारि दल रन मारि है घमशान ॥
शाहनशाह लिख्यौ जबै फरमान पहुंचो आइ
तब सैद अबदुल्लह षां लीनो सुअदब बजाइ
वह हुकम सिर धरि दै नगारो सु मिरि प्रभु को पाइ
डेरा सु आलल चंद करि अरि राह रोक्यौ जाइ ॥
फुनि आपु स्थिर करि रह्यौ थानो गह्यौ प्राग करार
भाई पठयो जंग को सब संग दै सरदार
से सुब सज्यौ सैफुद्दी अली षां बंक बीर उदार
साज्यौ निजामुद्दी अली षां कोपि गहि कर तरवार ॥
साज्यौ सिराजुद्दी अली षां बीर बलवान
फिरि सज्यौ राजा रतन चंद गयंद गहि किरवान

फिरि मीर मुहसन षान साज्यो वीर अनवर षान
साज्यो समुदर खान अरु इदगार वेग जवान ॥
मीरजा वली वहराम वेग चढ्यो गहे कर चाप
जेहि वाप वरकंदाज षां सु किताव पायो आप
अरु सज्यो त्यो दरवेशली षां सैद वीरत छाप
साजे वली सरदार केते सतु दारन दाप ॥

हरिगीत ।

इत अरे आलम चंद उत कोहउन देरा कियो
भिनसार होत दुहूं दिसा दुहूं दलपती डंका दियो
इत ए चढ़े उत वे वढ़े मन वढ़े दुऊं वागैं लियो
दल भार सों विकरार महि रजधान सूरजो पियो ॥
तव भयो देखादेष दुऊं दल दुऊं दल चापैं चढ़ी
वाजी वंदूषैं रहकले हथनाल धूम घटा मढ़ी
तव वीजु चमकनि झमकि त्यो समसेर म्याननि ते कढ़ी
लागा झराझर नानु गटपट रुधिर की सलिता वढ़ी ॥
ललकारि हांक निदंत सावंत दपट दुऊं दल धावहीं
गरवी मगरवी कर गहे झुंकि झपटि चोट चलावहीं
छिन जात धाई उठाइ एछिन अटल अरि वरआवहीं
दि पहर उसला पसल भटरन सिंधु पारन पावहीं ॥

× × × × × ×

यह वारहे के वालकनि को लयो अति गाढ़ो हियो
सैयद सिराजुद्दी अली षां तव सहादति कों लियो
हरषंत हूरनि हाथ को पुर प्रेस सो प्याला पियो
करि हाल निमकहलाल ओप सिपाह सूरनि को दियो ॥
यह सोर भो चऊं ओर ते दौरे सवे सरदारहैं
तित डारि ढालैं टारि कूटैं फारि जिरह अगारहैं

अरु छोरि वषतर तोरि म्याननि गह्यो करनि कटारहैं
चमके चहूं नेजामुनै झमकै घनी करवारहैं ॥
इमि दौरके चऊं ओर ते पर फौज घेरी जायके
तहं तीर वरछा वान गोली अंग अंग रच्यंगाइ के
समसेर वार झराझरी कर कर कटारनि घाइ के
झुकि झपटि झुरमुट षेलि अरि दल दियो महिवि थरायके ॥
लोटै किते भुमे परे कोऊ घाइ सो घूमें परे
कोउ भये मुरछावंत डर सो ते विना मारे मरे
सरदार अवदुलगफार के अंग अंग घन घाएनि भरे
रन भूमि में पायो नहीं जानै कहां किहिं लै धरे ॥
इमि कूटि भटकनि कटक लूटन लगे दरवर वैदरा
जिहि पाय में पनही नहीं भै खार ते ऊपैदरा
वाजे जसी ले शाइनामे धमक सो धमकै धरा
फरमै फतूहनि लै फिरे जस जग्यो सांवंत सैदरा ॥
कुतुवुलमुलुक सों तव मिजा मंजूर अरज सवै कियो
वाजे नगारे गहगहे आनंद सो हरष्यो हियो
सुनिकै सिराजुद्दीं अली षां की दसा गुस्सा पियो
आँषिं करेरी एठि मोछनि दांत ओठनि में दियो ॥
वोले सु अवदुल्लाह षां अव मैं महारन माडि हों
सिगरी पछांहीं फौज को कर कर कटारनि कांडि हों
आए जेते सरदार ह्वै तेहि प्राण डांडनि डांडि हों
सव सो सिराजुद्दी अली षां कै वीअर लेकै छांडि हों ॥
रनषेत में कुरुषेत सों तरवारि मार मचाइ हों
भुजजोर तें परओर के सव जोवते गहिल्याइ हों
तव शाहि फरुकसियर को वंदा वनैत कहाइ हों
[Line wanting in original] ॥

× × × × × ×

139 दिन ओर कुतुवुलमुलुक वोले वोलि साहेव राय सो
140 लिखि अरज शाहन शाह को सव भेद वात वनाए सो
भई हुसेन अली षां को लिषो सव समझाइ सो
जिहिं आइ ह्यां एलगार पहुचे साज फौज उपाए सो ॥
सुनि लिष्यो साहेव राय माथुर अरज पत्र तहां तवे
सफ जंग की सव वात जैसी भई जौन जहां जवे
145 फटनि पछाहीं फौज की आदम अमीरन की
औ फिरि लिषो हुसेन अलीय षां जू कौं सवै ॥

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159 यह अरज पत्र सवे लिष्यो पटना सो पुहुंचो जाइ के
160 पहिले हुसेन अलीय षान लीन्हो लिषा सुष पाइ के
वांचो सिराजुदी अली षां की दसा पछताइ के
रिस घंटि अरज पठ्यो सो आपुहि शाहि के ढिकआइ के ॥
वोल्यो कौनो अमीरन उम्मराव सु अरज शाहनशाह सो
रिस रहति रोकी नाहि क्यौं हूं अनुज को दुष दाह सो
165 पाऊं हुकुम इलगार पहुंचो जंग जैतक चाह सो
ललकारि कै कु कु करि फेरों एजदीनहि राह सो ॥
तव हुकुम कीन्हो शाहि दिन दै अव तहमुल कीजिए
वांके वनैत अमीर तिन को विदा आगे दीजिए
अव ऐजुदी सो रिस कहां ततवीर सो गहि लीजिए
170 फिर मोजुदीन पर साजि के चतुरंग फौज चलि लीजिए ॥

पादांकुल छंद।

और रोज भिनसार भयो जव
सज्यो शाहि दीवान षास तव
मिसिल मिसिल ठाढ़े अमीर सव
लियो मुरतुजा षांन वलि अव

सैद मुरतुजा षां वढ़ि आयो
साहनशाह ता सों फरमायो
फौज साज चाह्यो चित लीजे
प्रथम पछाहे पयानो कीजे ॥
हुकुम होत ही चले महावल
सैद मुरतजा षान साजि दल
कूच कूच यलगार पयानो
कियो वहादुरपुर थिर थानो
हजरति हुकुम फेरि यह कियो
विदा सु आजम षां को दियो

× × × ×

अथ सकल मीर अमीर सज्जिय
अरसला षां कों हुकुम किय
पेशषानो लै पयानहु
कूच एलगार ढीक गनहु
अरसला षां हुकुम धारो
चह्यो सजि दल द नगारो
पेशषनो लै पयानेउं
पांच कोस पयान ठानेउं
फजिर शाहनशाह सानेउ
सकल वृंद गयंद गानेउ
वजी नौवति गह गही तव
भई नौवत रावरी अव
घोर धौंसा धनि धकारत
फतेह फतेह मनु पुकारत
हो हु हो करनाइ वाजत
शाहनशाह हि सगुन साजत

सगुन सो सुरनाद वाजौ
सिद्धि राम करीजु साजौ
झाह झाहव झांझ झनकात
घनन लागिहि घंट घनघात
फीलवार निशान झहरत
मनहु अगा फतूह फहरत
आत पत्र अनूप राजत
इंद्र सौं प्रभुता विराजत
झालरी मुकु ता सु लच्छक
मनऊ तारा छत्र रच्छक
आफतावगी हासकैं कर
मनहु रच्छक संग दिनि अर
तोग सुंदर माह माही
सगुन की मनु देत ग्वाही

छप्पै छंद ।

फरुकसियर समत्थ शाह शाहां दल सज्जेउ
पष्षर पष्षरि वऊल वारवारन गल गज्जेउ
औधर धौंसा धमक घोर दसहूं दिसान भर
चमकत नेजे फहरवान वैरष निशानवर
भुव दलत मलत जेहि दिसि चलतक्क सोर चहु चक्क ऊव
अतिअक्क धुंधुरित धूरि मढ़ि आगताव धुवलोक धुव ॥
कौन सवल उत्थपिहि काहि निवल वल थप्पिहि
केहि महीप को मुलुक मीडि काहि समप्पिहि
काहि पाय गज रजि करिहि केहि पील पिट्ठी पर
घग्ग धनी केहि घरिहि दरिहि केहि तमकि तेग तर
अवहि मंडिहि षंडि सो केहि वढ़ गढ़ गढ़ पति थरथरेउ
सजि शाहनशाह फरुकसियत सो जव औधर हय पष्षरेउ ॥

दोहा ।

इमि सजि साहनशा जू कियो कौपि पयान
एलगारनि के कूच कौं कियौहि एंठिक ठान ॥
कूच कूच एलगार सो षजुरां पहुंचे आइ
आजम षां सजि फौज सो दरसे प्रभु के पाइ ॥
साजि कहादुरपुर मिल्यो सैद मुरतजा षान
उतरि वनारस ईद करि एलगार कियेउ पयान ॥
आनि वसेरे वीज झूंसी कियो मुकाम
आए संग महावली छुटि गे निमकहराम ॥
सयद अवदुल्लह षां की मुलाजिमति आइ
की मुलाजिमति संगही जेतक संग सहाइ ॥
हाथी घोने पालकी टंकी फिरंगी कोर
सरोपाउ सरपेच सज जेगा मनसव ओर ॥
शाहनशाहि दीनो तिने कुतुबमुलुक किताव
दियो हिजाफो जौन जेहि मनसव को असवाव ॥
सेतु वांधि सुरसरि उतरि प्राग सु पश्चिम ओर
चारि मुकाम तहां किए आगें दौरादौर ॥
मिल्या तितै फरजंद षां जगतजासु किरवान
सवल सलावति षां मिल्यो सैफ षान वलवान ॥
करे निकट महथा मिल्यो आइ छवीले राम
चारि हजारी राज पद तिन्ह को भयो सलाम ॥
अली असगर षान जू मिल्यो आनि हथियाम
चौ हजारि मनसव कह्यो षान जमान नाम ॥
पूरव छयो कुवरपुर विंदुकी पश्चिम ओर
वीच शाहि डेरा कियो भयो दुवन दल सोर ॥
पश्चिम फतिहाबाद तजि पूरव विंदुकी ग्राम
एजदीन डेरा दियो स कटक किते मुकाम ॥

षार वेद षंदक षनी कटक चारिहुं कोट
चुने अरावे अनगने भरी फौज तिहिं ओट ॥
दुहू महावल फौज सों तीनि कोस के वीच
रचौ वीच रनभूमि तित मचौ दंति मट कीच ॥
शाहिजादो हिरउल कियो दलपति शाहनशाह
सजे दलपति जित शाहि एते कीन्हे तित चाह ॥
अवदुल्लह षां वंकरन हुसेनली षां माल
रन थंभ आगें भए कुतुव कू डरीवाल ॥

मधुभार छंद ।

सज्यो अवदुल्लह षां जित
सज हुसेन अलीय षां तित
तित इनातुल्लाह षां सजि
रिस शुजाएति अली षां रजि ॥

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भुजंग प्रयात छंद ।

दुहूं ओर साजे महामत दंती
सजे पष्षरो लष्ष की पूर पंती
गड़ा दार घेरें सिरि कट्टवंटा
गजै मेघमानो वजै घोर घंटा ॥
घटा श्याम सी दीह तांविं अधि मापे
परां पष्षरैं झलरी झूल झांपैं
सजे पष्षरों भष्षरों लष्ष घोरे
मनो भानु जौ के रथी जोर जोरे
चले चाह सौं चंचले चाल वांकौ
दखाई तुरक्को तजीले ईरांरैकी
करै पौन सौ पौन की पायदारी

अरब्बी गरब्बी षुरीले षंधारी ॥
नबै ताट की से पटी के चन्हावी
कच्छी पीठ पूठों पले नीररावी
सजे संदली औ समुंदे सुरंगे
कबूतो वने फूलवारी सुअंगे ॥
जसे वोज संजाफ नीले हरीने
मुसुकी सजे पंचकल्यान पीले
वड़े डील के कान छोटे नवीने
सु चौरी खुरी चाकरे जासु सीने ॥
वड़े चंचले नैन के मुख्य सांचे
षुरीं वाल भूमै घनी दोष वांचे
सजे साजियों चारिहूं ओर जोधा
सजे साज लोहा वटो क्रत क्रोधा ॥
पिले चारिहूं ओर सूवे गरूरी
जिन्हों वार कै सत्रु की फौज चूरी
कहां लौंकहौं फौज में सूर राजे
किते को वलीलि वंबूषैं गराजैं ॥
सबै सूरिवां वीर वांके व नैते
सजें साज वाजी चढे हांक देते
कढैं फौज सौं दांकि घोरे धपावैं
किते कहूं कै कैसु भालैं फिरावैं ॥
लख्यो दूसरी ओर गाढ़ी अनोको
बद्यो कोपि कै पूत दिल्ली धनी को
दुहूं ओर ठाढ़ी चमूं वाहरौं कैं
दुहूं ओर के फौज ठाढे विलोकैं ॥
सु फर्रुकसियर शाहि के जोर सूवे
पिले चारहूं ओर साजे अजूवे

वजी दौह धौंसानि आवाज अच्छी
चहूं घां लखी जे वरच्छी वरच्छी ॥
छुटे त्यों अरावे उठी धूरि भारि
धुंवां की उठी धुंधुरारी अंध्यारी
वढै रोसनी ऊपरी वान छूटैं
मनो आसमानी महालूक टूटे ॥
पिले चोट कों घोट कें चारि फेरे
पिले ओपची तोपची तोपो घनेरे
चहूं फौज की वीर ता की बड़ाई
चमूं सत्रु का चूर कै कै हटाई ॥
वली उतरी फौज के गवऐंठे
महा मोरचा मीड़ि के पेलि पैठे
लख्यो एजु वार छूटो दुवारो
परी भाग भाग्यो तकैं कोइ नारो ॥
सभारै न घोरै रथौ हेम हाथी
सम्हारे न कोऊ कछू संग साथी
किहूं छाड़ि घोरैनि डाखो हथ्यारी
किहूं भागि सों आगेही पथ धारो ॥
करे कोऊ हा हा परै कोऊ पैयां
चले रामरैंगा व झैझा व कैभा
घुसे वाहरौ भागि केते निकामो
कीते को धरे वंदि नामीनि नामो ॥
कीते को मुग़ुमानी गरूरैनि छाए
वढें हौसला के तिया संगल्याए
तिन्है छोड़ि भागे छुटी चाल वांकी
गए फूटि ताले फटी हौसलाकी ॥
सुरोवै असीले मसीले सहेली

पुकारैं योदा आप दाकोन मेली
गरो ढावरो झांकि झोवै सुरोवै
सवै मौजदी कौं भरैं नैन कोसै ।
कहू वैदराकी वड़ी धूमधाई
चहूं लुंच लुंचानि लै आगि लाई
वरै छांहंवनी छांहं डेरा सु भारी
महा भीम फैली धूंवां की अध्यारी ।
कहूं आंच के तेज सों लाल फूटै
कहूं वैदरा वीर वाजार लूटै
कहूं वांस की गांठि फूटैं पटक्कैं
चटाचट्ट पाषान भारी पटक्कैं ॥
लुटै केसरी दाघ दाखौ छोहारो
लुटै चाव कस्तूरी का घन सारो
कहूं होत मोती वरैं चूर चूना
कहूं खैट लुटेरैं करैं मोट दूना ॥
जरै चार आचार चूरी चिरौंजी
कहूं कौन गटै कसेरु करौंजी
जरैं की लुटैं चीर चीरा जरीके
परे भोट के मोट लूटैं परीके ॥
भए वैदरा जौंहरी लूटि लटैं
छिटै ज्वारिलों मोट मुक्तानि छूटै
किती तीजरैं हाए हारट्ट लागी
किती कामिनी दामिनी रूप भागी ॥

दोहा ।

यहि विधि दल सव भंगियो एजुदी को जान
श्रीधर कवि आगु सुनो अव सव करो वषान ॥

अरज कियो इमत्याज षान प्रभु को पाइ प्रसाद
शाहनशाहि यह साहिवै फतेह ममारष वाद ॥
कियो षान दौरा ऊतो उन को अंग हर अंग
नौसिरी षां नंद इत सु हो हिरौल रन रंग ॥
अवदुलसमुद अलीम षां राजे षान अमीर
सादिक लुतफुल्लाह षां दिलदिलेर षां वीर ॥
मौजदीन के ए ऊते इतवारी उमराइ
हजरति के एकवाल सो रहे न रन ठहराइ ॥
एजदीन को जवरई लै सब गए पराइ
पान षइ आए हुते पानि पगए गंवाइ ॥
हाथी घोरे सुतर रथ महल वहल सुषपाल
तोप नगारे रहकले शुतरनाल हथनाल ॥
मोहर जवाहिर को गनै ढेर ठौर ही ठौर
ठाढे कुटे सराइचे करी वैदरनि दौर ॥
तहं ठाढे मुमताज षां हजरति निकट वोलाइ
शाहनशाह कीनो हुकुम तुम देषो अव जाइ ॥
मदमोकल हाथी तुरै तोप नगारो लेऊ
ओर लूटि मे जो लहै तोन ताहि को देऊ ॥

अधिंक छंद ।

करि फतेह शाहनशाह जू
हिय भयो परम उछाह जू
बैठे प्रभात देवान कै
सब वोलियो सनमान कै ॥
तहं वजत नौवति घोरह्वै
रह दीप दीप दोरह्वै
किय कंचु की इतमाम कों
आए अमीर सलाम को ॥

मुकता जंवाहिर वारहो
अंजुरी निलै फिटकारहौं
फुंनि भांति भांतिन्ह नजरि दै
लै मिसिल ठाढे में सवै ॥
कुतुवलमुलुक अरजी भए
उमराए वोलि दु वोलाए
मिलिओ मुजफ्फर षां तहां
कीनी कृपा सहेव जहां ॥
दीनो किताव धुरां धुरी
षाने जहांन वहादुरी
मिल्यो रहमति षां वली हद
मुत्तहौवर षां लह्यौ पद ॥
फिरि शाहि वकशिस साजियो
सिगरे अमीर नेवाजिओ
हाथी महामद के दए
घोरे इंरांक जएनए ॥
सुभ सरोपांए झलाझली
किय कनक वार सभा थली
जेगा कलंगी झल झलै
सरपेच साज भले भले ॥
समसेर भूषन जाहिरी
सज करो फौज जवाहिरी
तेहि भूमि चारि मुकामु कै
सव कटक कों विसरामु कै ॥
फिरि कूच कूच लगार को
जहं शहर शाहि मदार को
पहुंच्यो तहां दलु वीर को
किय दरस परसन पीर को ॥

दिन दस वसे तेहि थान जू
किय मेहर गरम देवान जू ॥
[Only two lines to this verse in the original.]

गीता छंद ।

695 फिरि मीर जुमिला वीर उत सों अरजपत्र पठाइयो
कासीद कागद कर लए दरवार द्वारे आइयो
मुमताज षान लिषान ले सुव शाहि पै पहुंचाइयो
वह ले तकररुब षां तहां मजमून वांचि सुनाइयो ॥
आकिल वकील वजीर सैयद अवदुल्लह षांन को
700 कायथ सिरोमनि दास राए महीप सांडी थान को
मिलि रह्यो मजिलिसि मौजुदी की सचक तत्व विधान को
उन लिष्यो कुतुवलमुलुक को सव भेद औ परवान को ॥
इत मौजदी मगरूर मस्त अल मस्त अमलै खाइ कै
सिगरे कलांवत ह्वै अमीर भरे रहो चितचाइ कै
705 आनैन आनै मननि मैं फूलेरहैं इक भाइ कै
माही मरातव अलम पंजा तोग नोवति पाइ कै ॥
दारू सु दारू भरत गोली अमल गोली रंग की
मिरदंग ढोलक तोप औ सुरनाइ रीति तुफंग की
प्याला पलीता सु भरकै तहं जोति मौजैं भंग की
710 दिन रात यह चरचा रहै ततवीर और रन जंग की ॥
सव कमल लोचन दुःख मोचन काम रूप अगोहरा
अति चतुर नृत्यक लानमे मघवान मंजिलिसि नोहरा
अनुराग उपजत राग सुनि सुनि कवित रस के दोहरा
मनु ढरे सांचे नवल नाचें नटामन के छोहरा ॥
715 कहूं सभा मस्त कलांवंती कहूं पातुरनि के गाइकी
कहूं नचत हरषे हीजरा झरि पगीऊ हिरआहिकी

कहूं छोकरे वागे वने दरवार कुं जरी न राहकी
यह मौजदी की मौज है गति और नाहि निवाह की ॥
अषत्यार कोकिलताष्ष षा अरु जुलिफिकार षा लियो
दौऊ रहे दरवार में वर वैर आपुस में कियो
ज्यों कठिन कसई नीव रोगी मूंदि आंषिन घूटियो
[Fourth line wanting in original.] ॥
रह्यो गाजियद्दी षां वली महमद अमी षां फूटि है
अवदुस्समुद षां कमरुदी षां जकरिआ षां छूटि है
तहं रहम रहमां षांन अरु तूरानिआ सव टूटि हैं
पर पंच कीनो मीर जुमीला जंग रनहिं जूटि है ॥
इक रोज वैठे मौजदी मदिरा वढ़ायो मौज कों
उतसाह सों चित चाह भरि करि हुकुम नव नव रोज को
तेहि वीचि आयो षवरि आएक फरुकस्याहि कनोज को
अरु एजुदी भागी लए हमराह सिगरी फौज को ॥
यह सुनत एजुदीन भाग्यौ फौज संगरी भगी
तह सकल मजिलिसि मौज में इकवारगी दःख सो पगी
तव लगी मुष विष सी विरी अरु गीत गारी सी लगी
अंग अमल की लाली घटी ततवीर औ डर रिस जगी ॥
कहां लों लिषिए कथा सव रीति कछु देषि परी नई
हहरे कलांवत गिरि गए मेह रानि को मुरछा भई
कहु परी ढनगति ढोलकी सुधि ताल घुघुरु की गई
सव गयो मद छुटि छाक सोरट हुहि आहि दई दई ॥
अति रिस भयो मन मौजदी वकि उठत वारहि वार है
यह काम चूकि कियो दियो करि छोकरा सरदार है
फिर वे तमीज अमीर सिगरे लै गए अषत्यार है
मन मै न आई मसलहति अपनी षता की हार है ॥
षोजे हुसेन न जंग जानत वात को कथनो कथो

कहं लरो लुतफुल्लाह सादिक सांचुहै पानीपथी
745 करि संग दीने और सिगरे मसलहति तिन की न थी ॥
सफ जंग जीते सैद सों हमराह कौन महारथी ॥
अव मैं चलो सजि सामुहैं काहि कौन धों ठहराइगा
मेरी अवाई सुनत सव दल एक एक पराइगा
सव ओस लो तकि उदित सूरज वूंद वूंद विलाइगा
750 नहिं वचन देंहों भागेहूं रन भागि को कित जाइगा ॥
अव भोर सों करि दौर पहुंचत एक एक हिमारिहों
कोउ जियत जान न पाइ है दरवार द्वार पछारिहों
करि सेर देहों मस अहारिन्ह टूक टूक वंटारिहों
फिरि वारहं की ईंट उघारि जल में डारि हों ॥
755 मेरे भुजावल शाहिजादेन सों नजौं लई गई
तरवारि के वल फौज के वल हिंद की प्रभुता भई
रन मारि तीनो पातशाह हि पातशाहति मैलई
सुलितान चाहत सो दिलि वहकाइ ल्याए औरई ॥
यह हुकुम पठयो ताहि जे पहुंचे भगोरा आगरें
760 वैठे रहो उतहीं सवै मिलि घाट घाट धराधरें
पुल तीनि वेगि वंधाइयो मजवूत वालंभपुर तरे
इलगार पहुंचत आइहों सफ जंग साज महा करें ॥
वकसी वोलाइ कह्यो सवारहिं साज सिगरो कीजिए
सव कों दु माहो पेशगी गनि रातिहिं दीजिए
765 करि मीर मंजिल कों विदा फिरि खवर सव थल लीजिए
ततवीर ऐसी साधि जो परं घाति राति चलीजिए ॥
फिरि हुकुम कीन्हो निकट जे सिगरे अमीर वोलाइकै
ततवीर चवे की करो सव राति रातिहिं जाइकै
सव साजि फौज प्रभात होतहिं होऊ हाजिर आइकै
770 इलगार उतरो आगरो मारों इंटाएं धाइकै ॥

यह हुकम निकसतहिं एकाएक सहर घरभर सोर भो
साजे अमीर सजी सवारी वजी नौबत भोर भो
जब ख्वार भो युद घटा घुमडो परे पाहन घोर भो
वद सगुन लषि सव कहै हाय कालिका को कोप भो ॥
775 दाहिने पर चील्ह सनमुष वाम वोल्यो काग है
अरु गई काटि गली विली थित राडरीत घराग हैं
आत पत्र निशान षंडित दंड परम अभाग है
जब ख्वार मौजुदीन भो वद सगुन लागालाग है ॥
दिन कटक माझ उलूक वोलत लूक टूट तरात है
780 कहूं श्वान रोवत सुरनि सों कहूं स्यार गन फिकरात है
महरात सिर पर गीध के गनयो वढो उतपात हैं
हहरे सिपाही सुपन में सव भागिवो वर रात है ॥
उतपात औ वद सगुन सिगरो मूढ मन वहराइकैं
एलगार पहुंचो आगरे ठहरो समोगर जाइकें
785 तहं मिले एजुद्दीन औ सिगरे भगोरा आइके
सफ जंग की कथनी कथी अति वात वनक वनाइकै ॥
विकरार वोल्यो मौजदी अव सैयदों सों वूझि हों
रन मारि लेउं गनीम कों तव वारहाहि अरुझि हों
सिगरो फिसाद कीयो इन्हों दिल मांह कीन्हो सूझि हों
790 एई अगो हर जंग के इनको लगावत लूझि हों ॥
सादाति षां मारा जिद कों मानि नातावता
फरजंद षां तिस का पिसर सजि फौज आगें धावता
यह भयो जो समसामदौला तेग फर फर कावता
रन माझ मेरे सांमुहे अव कौन धों ठहरावता ॥
795 पहिले छवीले राम एजुद्दीन सो मोजरा कियो
फिरि जाइकें उतहीं मिल्यो वदवष्त मोहि दगा दियो
अरु अली असकर षां मिल्यो उत जाइकें आगें ह्वै लियो

मन में न ल्याए मोजदीनहिं देषिए इनको हियो ॥
यों कहि मोहला लेन लाग्यो पांच लाष सवार भो
तित तो वषानो लाष द्वै गजराज कैक हजार भो
फिरि करी तोपन की शलगे गगन धूआं धार भो
धुरि धरा धसकत मेरु मसकत सवल यों दल भार भो ॥
यों लिषि सिरोमनि दास राए उलांक वेगि पठाइयो
दरवार कुतुवुलमुलुक के कासीद जोरी आइयो
सव अरथ साहिव राम माथुर प्रगट वांचि सुनाइयो
यह सुनत नैन रंगे भए अति वीर रस चित छाइयो ॥
हंसि कह्यो अवदुल्लाह षां गलवा भयो उत शाह का
पांऊं जो अव मैं नैकहूं करि हुकुम शाहनशाह का
एकवाल फरुक्कसियर को अरु करम एक इलाह का
रन दौरि तोरौं आजुहीं वल मौजदी की वांह का ॥
मजमून सुनित तजवीज करि करि फेरि अपने कर लयो
स्वारी तयार भईनई असवार सैयदद्वै भयो
षुशहाल मोछनि हाथ फेरत शाहि के मोजरें गयो
सव अरज कीनो अरथ शाहनशाह को हिय हरषयो ॥
वह मीर जुमिला को लिख्यो अरज सैद वजीर की
दोऊ वरावर सी विदी वरवात मीर अमीर की
अंषियानि सरस्यो वीर रस साहिव जहां रनधीर की
फर तेग वाहक हाथ फरक्यो घरी मोछैं वीर की ॥
वर वारहांपति वीर सैयद वजीर त्यों अरजी भयो
आयो महमद षान वंगस साजि साज नयो नयो
असवार वीस हजार वषतरपोश ज्यों घन उनयो
सषरैत वीर वली सवै पषरैत हाथी औ हयो ॥
तव हुकुम कीन्हो शाहि फरक वा को कियो कूच करार है
मिलियो महमद षां मोहल्ला दै चल्यो इलगार है

हमराह वीर अमीर जंगी साज तेज तयार है
गहि अरसला षां पेशषानो चलत आशु अगार है ॥
स्वारी तयार भई प्रभातहि शाहनशाह सवार भो
मिलियो महमद षां सहौ असवार वीस हजार भो
षुद आपु पंज हजार सव सरदार मनसवदार भो
हमराह हिरउल कें कियो एलगार वीर अगार भो ॥
करि कूच कूच लगार को एलगार पहुंच्यो आगरें
जल पियत जमुना को दुओ दल सवल वालभंपुर तरे
तित पार वार मोहार सों मिलि दलप दोउ देरा करें
ए पेलि चाहत पार उत वे घाट वाट धराधरें ॥
दुहुं ओर नौवत घोर घुमरत सकल जल हल कंपिओ
दुहुं ओर झंडे झलमलें फहरानि उड़गन झंपिओ
रजधान भानु विमान वे लषत असमान सु ढंपिओ
दुहुं ओर दल भर सहस फनिफन तुरग चरनि चंपिओ ॥
दुहू ओर वादल सूदल सूर मयूर ज्यों हरषा करै
दुऊ ओर तोपन की सलंगें गाज गरज रषा करै
दुऊ ओर चात कपिक गुनो गन कित्ति सों कथा करै
ऊहू ओर गोला वान वूंदनि राति दिन वरषा करै ॥
दुऊ ओर भट ठट मन वढे सफ जंग की अति मनमनी
दोउ पेलि चाहत पार भो नित ठठत ठाठ दुओ अनी
लगि नीर आवत क्रुद्ध उद्धत दलप दोऊ दिल्लीधनी
विकरार धार महानदी पछतात त्यो दोऊ पनी ॥
तेहं वीच वजीर सैयद अरज आवतहीं कियो
प्रभु राज चछु प्रतछ लषि थल षवरि आनि हमें दियो
कछु दूर पश्चिम आगरे थाह जमुना को लियो
पायाव पारहुं वार लों सुनि शाहि को हिय हरषियो ॥
करि झूठ दीन्हो गुलगुला तिरि भोंजदी उरवार भो

यह सोर भो चहुं ओर जोर दिलेर दल तैयार भो
कछ फौज भेजि गनीम मुष पर ग्राहनग्राह तयार भो
तव राति रातिहि दौरि सैयद थहरि तरि करि पार भो ॥
अडि रही जौन गनीम मुष पर फौज तोन वलाइकै
चलि कोस चारिक पहर एक तितैं रह्यो ठहराइकै
जव भयो भोर अंदोर दहुं दिसि चढ्यो ध्वान वजाइकै
अति वेग तेंग धनेस जमुना कूल पहुंचे आइकै ॥
जव आनि पहुंच्यो जोर दल वल समय साधन सो सध्यो
अति धार भार षभार फनि पुर फनि सह सौ फन षध्यो
रजधांन सों असमान मुद्रित सेतु सिंधुन मे वंध्यो
जल प्रथम को वनि वीच के थल पाछि ले तरिवो नध्यो ॥
एहि भांति ग्राहनग्राहि जमुना उत्तरहि तें उत्तरो
पर ओर रोज विहां सुं पुरव कोस दैक सिकंदरो
तेहि वीच सरिता निकट भोकुलि कटक को डेरा षरो
सुनतै अवाई मौजदी की फौज मे षरभर परो ॥
यह षवर सुनतें मौजदी मन में महा रिस सो भरों
वकि उठ्यो यारहु देषना अव दौरि जीवतहि धरों
वांचे न कोऊ भागेहूं गहि एक एकहि संघरो
इन्ह कियो ढाढ सु कै ढिठाई सो सजाई इन्हे करो ॥
कहियो करेरे नैन करि करिपि हेरनि ते कढ्यो
समसेर सरकत षुनिस षरकत मोछ फरकत मन वढ्यो
चतुरंग अंगी साज जंगी मत्त मैगल मैं चढ्यो
धौसा धोकारत धरनि धुकि धुवलोक धुरिन्ह सो मढ्यो ॥
हमरा ह्वै भट पाच लाष भिलाष मन रन के भरे
सव जिरह वषतर पोश भष्पर वारहें पर पष्परे
एह भांति राति वस्यो वली चलि ओर दछिन आगरे
फिरि भोर होतहिं दौर करि डेरा करे इसकंदरे ॥

रन भूमि वीच रची सु अंतर कोस द्वै दुऊ फौज सों
थित पूरवी पर ओर ओपरवार पूरव औज सों
दोऊ वीर वांके हरषि हांके त्यों अमीरनि सौज सों
फर भोर सत्रु संघारिए मजू जमन की मौज सों ॥
संवत सु सत्रह से ओन्हत्तरि पूस पून्यो वुध तहि
सम सो अग्यारह तेतिसा माहे मोहरम चौदहीं
अरु पातसाही माह आजुर वाएसी ओधर कही
सफ जंग की साएत सधी साहेव जहां कीनी सही ॥
तित भोर सो लगि पहर द्वै वनवारि धर वरषा कियो
जव घुले वादर हरष सों दित्यो धनी डंका दियो
दल सजे वीर अमीर सैयद वजीर त्योंहि यह रषियो
चतुरंग जंग उमंग रन भूमि पिलि पहिले लियो ॥
फर वीर चढि ठाढो भयो हमराह सव सारी ठटी
जिहिं ओर जो दलु चाहिए तिहि ओर त्यों फौजें वंटी
लहि मिसिल सिगरे अगुहरे रजधान सो सरिता पटी
अति सूर झंपत कुम्भ कंपत सेस की वलता घटी ॥

विलास छंद ।

ऊकुम ग्राहि को लै गल गज्जेउ
कुतुवलमुलुक दाहिने सज्जेउ
वषतर पोश वीर हमराही
काल वारहें काल सिपाही
सैद सुर रन काल सिपाही अति उतसाही ह्वै हमराही सकल सजै
जे ग्राहि हुकुम लहि तेगे गहि २ मारऊ २ कहि कहि कहि गरजै
वागें ढोली धरी घोरें दप करि मन में भरि सफ जंग मजै
अवदुल्लह षान सैयद के धौंसे दष्षिन गहिरी वंव वजे ॥
दीलाजाक लोदी लोहाणी

पन्नी तरीन सूर सरवाणी
905 दाउदजई षेशगी गबी
सु महमद विट्टनी पबी
विट्टनी पवी मत्ती गबी अस्व अरबी पषरैतै
बनि बषतर झिलमें दाए दिल में जैत कतिल में सषरैतै
पाठे पठनैतटे लोह लपेटे कोहनि फेटे षषरैतै
910 यों अवदुल्ल षां संग वीर महमद षां वंगश अगरैतै ॥

× × × × × ×

कवित्त ।

1109 रीझत जब नेक मौला षन को मंगन महि को सकल लहै
वरनै कह लगि दीन के दारिद हेमवत्त सो सकल पद है
दरवाजें सदादान को धौंसा वजतु गहिरि वंब रहै
मुमताज षान वलवान वीर ऐसी विधि श्रीधर सु कवि कहै ॥

× × × × × ×

हीर छंद ।

1249 तब मौजदी भन रोस के
चहुं ओर वांकी फौज के
हिरउल सु कोकिलताश षां
वल वंक वीर फतूहदां ॥

× × × ×

हरिगीता छंद ।

1309 दुहुं ओर फौजें साजियो गलगाजि भट ठाढे भए
1310 बाजे नगारे फौलवारे घम धुनि धुव कंपए
षुर थार भार दुधार सों छुटि छार सूरज झंपए
तह बहलकी झुमके मेरह हलत पहल समसुष वंपए ॥

दुऊ ओर फौजनि औज सो रन मौज देषादेष भो
हथनाल तोपैं वान जाल विसाल गरज अलेष भो
1815 धोरनाल धोर अंदोर दुहुं दल रहकला सवि सेष भो
फर वजौं वह कि वंदुष अगनित तित वनैतनि तेष भो ॥
कड कड कडा कड सो अरावे छुटैं तट पकनि टाप की
चहुं ओर घोर घटा मढी धुंव धार ताप तराव की
वर वान वगरत वीजुरी सम गोल ओला थाप की
1820 नहि पहरकै एक पिछानि का छरही पर की आप की ॥
छुटि गयो धुंधूकार त्यो भिनुसार सो दुहुं दिसि भयो
ललकारि वीर अमीर सांवत चापसर कर वर लयो
दप करत आगे वाजि वागें मौज मोदमने भयो
वजि उठे मारु मारु मारु अंदोर रन मंडल छयो ॥
1825 तहं तीर तर तर वान सर सर सु भर भर गोला चले
पग पिलत आगेहीं आगेहीं सावत भूप भले भले
भाट लाल मुष सुष भरे पीरे रंग कायर हलहले
जिमि देषि जाचक दानि सुष सूम मुष दुष मुष वेकले ॥
इत उत दुहू दल के जितैं जे वीर वीर वीरों विरे
1830 ते करनसाके वलिक वांके हांकि भट भट सों भिरे
समसेर सरकि सिरोहवार सम्हार सांवत सिर चिरे
दीनी झमाझम कि झरझ झूमि झूमि लेते गिरे ॥

× × × × × ×

1433 कल लेन देतन रहकले हथनाल घन घुरनाल है
तूफान फहरत तुफंग की फहरात वान विसाल है
1435 तहं तीर सलभ समूह सम सुरलोक तरस रजाल है
असमान भानु विमान गोरूंकि भयो धुधु काल है ॥
तव वीर वीर विरां विरे मनु गहवरे भट भट भिरे
वजि उठे मारू मारू मारू पुकार करि करि मुर भिरे

वानैत गवीहै अरवी वीर गवी कर घिरे
तहं होतहू हफ काफ की फर मुषन काहू फिरे ॥

× × × × × ×

चहुं ओर फौजनि फौज सों मन मौज मारु मही परी
हथियार भार दुधार भर मनु मघा मेघनि की भरी
जिर जिलम कुंडि कुरी कुरी किरि गई वषतर की करी
करि मारु मारु सम्हारु यार सम्हारु सुनि यतलल करी ॥
घमन घटा घोर घमंड सो सम घुमडि फर फौज रहीं
धौंसे धोकारत गरज गहि तरवारि चमक छटा सही
झर तीर गोलिन वार गोला परत ओला स तहां महि
मची मेदनि गूद कीच कृपान सैयद जव गही ॥
मद भरे झूमत षरे घाइ अघाइ करि वरथरि अरै
सिर सरत श्रोनि धार मनहु पहार सो झरना झरै
वढि चली लोहुन की नदी लहरै लषें कहि को तरै
तेहि तीर दल दल मास को वल पठान काहूं को परै ॥

कवित्त छंद ।

वकसत कहा मौज रोज रोज कवि गनत काहेते करत वांकै
वीरन की कर है
हिम गिरि अरि हद कै हट को वदेस लगि कौन ऐवु दे कै
जीत्यो जस सो मयंकु है
श्रीधर भनत पंच मुष को परम प्यारो पंच मुष विक्रम भर
धारे पांचै अंकु है
कीरति महीपति लाल छत्रसाल जू की काहेतें वढति विर
दातानि कलंकु है

× × × × × ×

1533 फरुकसियर शाहि जहांदार शाहि दोऊ आगरे अगारी अरे
पातशाहीहेत मै
श्रीधर वजत मारु वाजे वाजे वीर मुडि गई वाँगें रहे
केतक न चेत मै
अंगद सो अडो पादशाहति पलटि डारौ एवौ एतो
आजम षां सवल वनैत मै
महा छव भारथ को कमनैतो पारथ को जैसो भीम भुज
वल भाष्यो कुरुषेत मै ॥

× × × × × ×

1545 श्रीधर अवाई देषि फरुकसियर जू को आयो मत्त
मौजदी अनेक अभिलाष के
धरि कु घमड़ घोर मारौ गई मुरि वाँगें अडियो छवीले
राम राजा मन माष के
मारि पर दल हरषायो जूथ जो गिनो को करत वडाई
सिवा संकर हि साथ कै
एकै वीर कैयो लाषें एककैन आन्यो मन एकही गनत
कैयो लाष कै ॥

× × × × × ×

1599 शादी शादनामह को उछाह अति पतरन को अंग अंग
वाढो रंग वाढोहीं रषत के
1600 तेरी पातशाही पातशाही पायो जेब फल श्रीधर सु
वरषत के
श्रीधर भनत पातशाहन को पातशाह फरुकसियर नर
जवर नषत के
तिनके वकत जेवाई लषत तषत तूहि वैथत तषत वाढो
वषत तषत के ।

दषिन धौल पौल पछम ऊदी जैजीत पूरव अपूरव
हटेलो हाथ लायो है
श्रीधर शाहनशाह फरुकसियर नर सातों दीप सरहद
हिन्द के मिलायो है
1605 दिन दिन वाढतहि वाढ्यो दिन दिन दिन दिन दूनि
पातशाहत वढायो है
अरु पातशाह पातशाहि पावैं जेव पाए तो सो
पातशाहि जेव पायो है ॥
घेरो खारा वूतार भौरी सु वदार दल घल घूंद
कीनो छीन एजुदी को
धावा करि पूरव तें डावादार फौजनि की मीना सो
वकर लीनो शाह मौजदी को
श्रीधर भनत वातशाहन को वातशाह फरुकसियर
भू पनाह दोऊ दीन को
1610 मुलुक मुलुक दौरें खवरें फतूहन की कांपियो डर
गव्वर हरथ वढ्यो दीन को ॥
कोऊ ढूंढो कोऊ दाह काहूं में न गुन भारो कोऊ
वारनारी वस में न आयो हैं
सुन्दर सुजियान सुजा शीलवन्त और जवान
पूरो एक तोहि विधि नय वनायो है
श्रीधर भनत सानी जलालुद्दीन अकवर वातशाह
फरुकसियर वातशाह भर पायो है
1614 वाम पातशाहित सों पूर करि करत तोहि देष
रीझ जै जै माला पहराइयो है ॥

× × × × × ×

TRANSLATION.

[Lines 1–4, Invocation.]
5 Çrīdhar *alias* Murlīdhar, twice-born, lives in Prāg,
By telling this pleasing tale of kings he increases affection;
Farrukhsiyar the king is young, strong, eloquent,
And the giver of gold to all the nobles.
A trader's letter came, suddenly arose desire,
10 Having vomited, Bahādur Shāh went to heaven.
Hearing the news, forthwith the generous Farrukhsiyar
Decided to raise a force and make a rapid march,
He sent for his *Bakhshī*, A'ẓam Khān, and gave order :—
"Now let troops be raised, as many as can be got."
15 Then, after ten days or so, came the trustworthy news,
Ẓū'lfiqār and the nobles had all gone over to Mu'izzu-d-dīn,
Ẓū'lfiqār Khān lead astray all the army, using deceit,
Otherwise who could overcome in battle one so powerful.
Mu'izzu-d-dīn raised the umbrella, ordered the public prayer perversely,
20 Set out for Dihli, wrote and sent out rescripts to the four quarters.

Tomar Chand (21–38).

When this news came
Then the wise Farrukhsiyar
Called for all the nobles,
Conferred gifts on all the heroes.
25 To all he gave the order—
"Now get together an army."
After this order, the next morning,
He raised the umbrella, sat on the throne.
All the king's friends
30 Then began to enlist soldiers.
'Abdullāh Khān made ready,
He fell into a great rage,
The king's order issued,
He reached Allāhābād.
35 Of *ṣūbah* as well as *sarkār*,
Of all he took full possession,
The heroic head of the vanguard
Set up his armed posts.

Doharā (39–70).

Then Mīr Jumlah, a noble, clever, deep, strong of arm,
40 Fought Mu'izzu-d-dīn's army, grasping the sword,
Arranged all the *ṣūbahs*, walked circumspectly,
And reported all the facts to the king, where, when, and how.
Thus Mīr Jumlah, the hero, reported in a long letter—
"They have made Sayyid Rājī Khān governor of Prāg,
45 "He has started, his avant-garde is Sayyid 'Abdu-l-ghaffār,
"Behind comes a great army led by Prince 'Izzu-d-dīn."
When all these details from Mīr Jumlah, the hero, arrived
Before the king, shelter of the world, the powerful Farrukhsiyar,
Hearing them and looking at the nobles, with fitting anger,
50 Spoke Ḥusain 'Alī Khān, the fighter of Kūrā, strong as an elephant,—
"By this the fortunes of the king of kings are not one moment threatened,
"To meet him 'Abdullāh Khān singly would be enough,
"Let grace be shown him quickly, send him a written command,
"That wretched army will he rend, will overcome it in battle array."
55 When the rescript that the king of kings had written arrived,
Sayyid 'Abdullāh Khān took it, carried out the usages of respect,
He placed the order on his head, with his drums remembered his Lord,
He raised tents towards Ālam Cand and blocked the road.
Then he stood fast, making Prāg his fixed place,
60 Sent on his brothers to battle, under them all the leaders,
Thus joined Saifu-d-dīn 'Alī Khān, brave, heroic, liberal,
Najmu-d-dīn 'Alī Khān, the fierce, started sword in hand,
Sirāju-d-dīn 'Alī Khān, too, joined, the brave and strong;
There also came Rājā Ratn Cand, the wise, armed with sword,
65 Mīr Muḥsan Khān also joined and brave Anwar Khān,
Then joined Samandar Khān and Yādgār Beg, the fighter,
Mīrzā Walī Bahrām Beg, mounted, grasping his bow,
(He whose father is Barqandāz Khān, a title he too obtained),
Darwesh 'Alī Khān joined, the Sayyid marked for victory,
70 There came many brave leaders, severe and proud of nature.

Harigit (71–170).

This side halted at Ālam Cand, that side encamped at Kohun,
On both sides when day broke both lords of battle beat their drums,
As these mounted, those advanced, full of zeal both seized their reins,
The whole army was in agitation, and the court beloved of the sun;
75 When the armies came in sight, they both cocked their guns,
Muskets, swivel-guns, elephant-pieces sounded loud as thunder,
Then lightening gleamed and glistened as the swords left their scabbards,
It began like heavy rain of sorts, in the mêlée blood ran in streams,
Urged on with unceasing cries, the brave warriors galloped, both armies rushed,
80 Seizing their swords, jumping and springing, they delivered blows,
One moment down, then up again, and the next moment on without flinching,
For six hours, in confusion, the heroes braved the clouds and streams of war.
[The Sayyids fight on (83–98) till Sirāju-d-dīn 'Alī Khān is killed].
99 Having made firm his heart, the Bārhah boy,
100 Sayyid Sirāju-d-dīn 'Alī Khān, received his martyr's crown,
Joyous from the Hūrī's hand he drank the full cup of love,
He did his duty loyally, bestowed lustre on the illustrious army.
Thus noise arose on every side, all the leaders rushed,
Advancing they threw down buckler, cast off head-pieces, tore their shirts of mail,
105 Quitted breast-plate, broke their scabbards, laid hand on dagger,
Lances glittered everywhere, the sword blows fell many and thick.
Meanwhile men ran from all sides, surrounded the whole army,
There arrow, spear, rocket, bullet, reddened body after body,
Swords shone and glittered, daggers wounded with a "kar-kar,"
110 Tossed to and fro the crowd struggled, the chiefs of the army stood fast.

Many lay on the ground writhing, many wandered wounded,
Many were like to faint from fear, and died without being struck.
The leader, 'Abdu-l-ghaffār's, body was covered with wounds,
In the battle-field he knew not where nor how to hold his footing.
115 Then the army made off, the scamps rob the money bags,
He whose foot had no shoes was exalted on horseback;
Rushed the famous one, shouting the king's name, threatens with thumps,
Wherever he goes the hero bears the decree of victory.
When Mīrzā Manẓūr told all the story to Quṭbu-l-mulk,
120 The drums beat with long throbs, delight blossomed in his breast.
Hearing of Sirāju-d-dīn 'Alī Khān's fate, he fell into a rage,
His eyes stared, he twisted his moustache, his teeth bit his lips.
Then spoke 'Abdullāh Khān, "Now will I fight a great fight,
"To cut to pieces the whole western army I draw my dagger,
125 "As many leaders as are come, their souls shall pay the penalty,
"None shall be let go till I am revenged for Sirāju-d-dīn 'Alī Khān;
"In a battle-field like Kūrukhet, I will raise a contest of swords,
"By strength of arm when I and my kindred have been wounded unto death,
"Then may I be styled a faithful follower of Farrukhsiyar."
[Line 130 is wanting. (Lines 131–138) The Sayyid's brothers return to Allahābād; they and their commanders are commended and rewarded.]
139 Next day Quṭbu-l-Mulk called for Ṣāḥib Rāe, and said,
140 "Write to the king of kings the news, telling the whole story;
"Write to brother Ḥusain 'Alī Khān, instructing him of all,
"Wherever he is, let him hurry here, gathering a sufficient army."
Ṣāḥib Rāe, the Māthur, heard and wrote there and then a letter,
Told of the battle array, all things as they happened—how, where, and when,
145 The repulse of the western force, the advance of the nobles;
Again he wrote to Ḥusain 'Alī Khān the whole story.
[The contents of the letter are then given (lines 146–158).]

159 This humble letter was sent off and reached Paṭnah,
160 First Ḥusain 'Alī Khān took the letter and was pleased,
Read of Sirāju-d-dīn 'Alī Khan's fate and sorrowed,
When his anger had decreased, he read out the petition to the king.
Thus spoke the noble of nobles to the king of kings:—
" When angry, none can stop me; my grief burns for my young brother,
165 " Give me orders, I make forced marches, I am ardent to fight,
" By calling " hish-hish " I will turn 'Izzu-d-dīn back."
Then the king gave orders—" Please wait a day or two,
" Let some smart, loyal noble be sent off ahead,
" What good is rage at 'Izzu-d-dīn now, better take counsel,
170 " Then let us start with a perfect army against Mu'izzu-d-dīn."

Pādāukul Chand (171–376).

Next day when morn appeared
Then the king held privy audience,
Group by group stood all the nobles.
Murtaẓā Khān took the lead.
175 Sayyid Murtaẓā Khān advanced,
The king of kings addressed him,—
" See to getting ready an army,
" You be the first to start to the west."
Instantly obeying, the hero went.
180 Sayyid Murtaẓā Khān took an army,
Set out by forced marches,
Made Bahādurpur his fixed camp.
Again His Majesty gave an order,
A'ẓam Khān was despatched.

[Here follow (185–228) the names of many men who joined. Darbars were held daily. Ashraf Khān arrives and is made Khān Daurān, 229–236. Ibrāhīm Ḥusain was sent towards Bhāgalpur, 243, 244. Ghairat Khān was left in charge of Paṭnah, 251, 252. The following couplet, 257, 258, is worth quoting for the quaint inversion in the second line:—

Sajyo Husen Alie Khān, bal,
Mahābīr, Umrāu-amīr-al.

He took command of the vanguard. We come next to Farrukhsiyar's march from Paṭnah.]

347 All the nobles and chiefs got ready,
The order was given to Arslān Khān,—

"Take out the advanced tents,
350 "Count the forced marches exactly."
Arslān Khān obeyed the order,
Mounting took his army with drums beating,
He took out the advanced tents,
Marched five kos and encamped.
355 Next morning the king of kings started,
The throng of elephants roared,
The royal march was beaten loudly.
Then played the music of His Majesty,
The big drums shook with mutterings and growlings,
360 Men shouted "Victory! Victory"!
The trumpets brayed "ho-hū-ho,"
The king of kings' good omens appeared,
The hautboys sounded happy augury,
Rāma and the sages joined the throng.
365 "Clash, clash," clanged the cymbals,
Jingling bells began their "tinkle, tinkle,"
The elephant-riders displayed their standards,
In front ran men shouting "Victory"!
Everywhere incomparable brightness reigns,
370 The splendour is as that of Indra's heaven,
Fringes hang over their faces,
Guardians of stars and umbrellas,
Sunscreens waving in their hands.
Hearts full of joy shout for the Faith,
375 Yak-tails, *sundar*, the fish-dignity,
Give evidence of happy augury.

Chappai Chand (377–388).

Farrukhsiyar, powerful, king of kings, led his army,
Many armour-clad elephants trumpeted and roared repeatedly,
The lordly drums resound and thunder, filling all the air,
380 Lances glitter, pennants flutter, as also the ensigns,
Soldiers wherever you turned, uproar everywhere,
It was very dark from mist, the sun hidden, the sky covered.
No strong man failed to arise, the weak ones gathered up strength,
Many rulers came from afar to conquer kingdoms,
385 Many were lords of elephants, many sought that rank,
Many swordsmen stood, holding proudly sword and sabre,
Now from every hut and corner throngs of men confusedly jostled,

To join Farrukhsiyar, king of kings, whose good fortune called aloud.

Dohā (389–422).

Meanwhile the king of kings marched in extreme rage,
390 Made forced marches, halted at several places.
By hurried stages he reached Khajurān,
A'zam Khān rejoined and beheld the face of his lord.
At Bahādurpur they found Sayyid Murtaẓā Khān;
Crossing to Banāras they observed the '*Id*, then hastened on,
395 Came through Baserī, encamped in Jhūnsī,
The valiant followed, the faithless vanished.
Sayyid 'Abdullāh Khān did homage,
With him made obeisance all his followers;
Elephants, horses, litters, swords, shields, weapons,
400 Robes, jewelled aigrettes, and high rank
The king of kings gave with the title of Quṭbu-l-Mulk,
Gave promotion and all things pertaining to rank.
He made a temporary bridge, crossed to the west of Prāg,
There halted four days, then rushed again onward.
405 Then came Farzand Khān, world-renowned swordsman,
Strong Ṣalābat Khān came and Saif Khān, the valorous,
Acting ever a leader's part Chabīla Rām appeared,
As his welcome he was made Rājā and *Cār-hazārī*.
Next joined 'Alī Aṣghar Khān, who came to Hāthīgrām,
410 Received the rank of *Cār-hazārī* and the name of Khān Zamān.
Passing east of Kumwarpur and to the west of Bindukī
The king encamped between them; there was tumult in both armies.
Leaving Fatḥābād on the west and on the east Bindukī village,
'Izzu-d-dīn placed his tents and encamped his army,
415 Fenced himself and dug a ditch, made a fort round his army,
Collected countless carts, made of them a bulwark to his force.
The two strong armies lay three *kos* apart,
Kept the battle-field in the midst, the mad elephants trampled it into mud.
The prince was sent in advance by the ruler, the king of kings;
420 When the king's army arrived, they had forthwith desire.
'Abdullāh Khān, quick in battle, the champion Ḥusain 'Alī Khān,
In front of the battle-pillar went the upholder of the Axis.

Madhubhār Chand (423–548).

423 Then joined 'Abdullāh Khān
Also Ḥusain 'Alī Khān,
425 'Ināyat Khān, too, joined,
And Shujā'at 'Alī Khān, the fierce.
[Then follows (427–548) a long list of chiefs and nobles, each with some epithet.]

Bhujangprayāt Chand (549–636).

549 On both sides were ranged the raging tuskers,
550 Clothed in armour, row upon row,
The mace-bearers surrounded them, their heads were lacerated,
The dusky ones screamed, the loud bells rang.
Their bodies like lowering clouds, great beyond measuring,
Bearing iron armour, covered with fringed housings.
555 Thousands of armour-clad horses came clattering,
It seemed like the sun's chariots gathered together.
Eagerly, with playful gait, went the spirited ones,
Streams of Turkī, Tāzī, Īrāqī horses,
They steadied each other, foot close by foot,
560 Arabs, and western ones, sportive Qandahārīs.
They leapt like acrobats, their forelocks plaited,
Flanks, backs, loins, eyelids, free of fault,
Cream-coloured, bright bays and chestnuts,
Handsome shapes making a flower-garden.
565 Like the splendour of borders, blue and green,
Dark bays, with the five lucky marks, and light duns,
Great in girth, small-eared, full of youth,
Their hoofs large, their chests broad.
Restless-eyed, their heads good-tempered,
570 Hoofs and coat shining, compact, ready for fatigue ;
Warrior allies came from all quarters,
All the iron-clad heroes joined, boiling over with rage.
Everywhere proud governors jostled each other,
A crowd enough to pulverize the enemy,
575 Wherever you look the army is full of kings and heroes,
Many strutting about discharge their guns.
All the valorous, heroic, active, loyal,
Came with harness rattling, mount with shouts,

Issue from the army, and shouting urge their steeds ;
How relate the twirling of their spears !
Behold on the other side, rare and undaunted,
Advances raging the ruler of Dihli's son ;
On two sides stand the enemies like flower-beds,
On two sides the armies stand looking.
With king Farrukhsiyar are the governors of provinces,
A wondrous crowd of allies jostled everywhere,
Loudly resounded enlivening music,
Everywhere spears thick as gathering clouds.
As the field-pieces fired a great dust arose,
There arose from the smoke great clouds and darkness,
Flashes of light came where the rockets flew,
It was as if the great vault of heaven had burst.
They threw their missiles, doing harm every time,
Armed men and gunners fired many cannon,
The heroes of both armies advanced,
They dispelled and trode into dust the enemy's array.
Verily that army's conceit deserted it,
Taking the chief batteries they crowded in,
'Izzu-d-dīn's men began to quit the walls,
Turned and fled on beholding those wrathful men.
They abandoned horses, carriages, gold, elephants,
No one collected aught of his belongings,
Some left their horses, threw down their weapons,
Some fled, taking the road in front of them.
Some moaned "hā, hā," some fell at the men's feet,
They went creeping and crawling, as best they could,
They ran out and fled, those miserable wretches,
Many stood calling aloud the names of God.
Many mighty men abated their pride,
Valorously abandoned all they had,
Leaving all they fled, forgot their strutting gait,
Their star had set, their wits had fled :
Everybody, servants, learned men, waiting maids
Calling " Lord ! bestow on us some helper " !
[Garo ḍhāwaro jhāṇki jhībai surosai,]
All piled on Mu'izzu-d-dīn fitting curses.
Some seized on money-bags with great glee,
Everywhere the camp plunderers ran with torches,
Lighted the thatches and the mighty tents ;
Great fear spread, the smoke made a darkness.

Here from the hot flames red light broke forth,
Elsewhere the heroes of the *bāzār* stole the money bags,
There the bambū knots split with a spluttering sound,
Crashing and snapping, the heavy thatches crackled.
625 They plundered saffron, wine, spirits, dried dates,
They took all the bags of walnuts and musk,
At places pearls were burnt into powder and dust,
Everywhere squatted plunders tying huge bundles.
Pickles, powders, and *cironjī* nuts were burnt,
630 Elsewhere jujube fruit, tubers, and fever-nuts,
They burnt or took clothes and turbans of gold brocade,
There lay about many bundles, women were robbed.
The jeweller's bags were carried off,
The jewellers dispersed, their bundles lay scattered,
635 Crowds of traders cried, "Alas! we are undone,"
Numerous lovely women fled, their faces veiled.

Doharā (637–656).

Know then that thus fled 'Izzu-d-dīn and all his men,
Listen to Çrīdhar, the poet, as he tells the whole story.
Imtiyāz Khān reported, bringing a good gift for his lord,
640 "My Lord! may this victory be of good fortune to the king of kings!
"They sent Khān Daurān as chief, one fit for any enterprize,
"Nausheri Khān, his son, was sent with the vanguard to battle.
"'Abdu-ṣ-ṣamad Khān, Rāje Khān, the noble,
"Luṭfullāh Khān, Ṣādiq, Dildiler Khān, the brave,
645 "Such were the nobles trusted by Mu'izzu-d-dīn,
"Against your Majesty's good fortune they could not stand in battle;
"From 'Izzu-d-dīn's harshness all went wrong,
"They came to eat *pān*, they threw away hand and foot,
"Elephants, horses, camels, ox-carriages large and small, litters,
650 "Cannon, kettle-drums, swivel-pieces, camel-guns, elephant-guns,
"Gold coins, jewels uncounted, in heaps strewn everywhere,
"The vacant enclosure stands, surrounded by bags."
There stood Mumtāz Khān; His Majesty called him near,
The king of kings gave order—"Go you now and see,
655 "Take the war elephants, trumpets, cannon and drums,
"All the rest of the plunder leave with whoever took it."

Ardhik Chand (657–694).

The king of kings having gained a victory,
His heart was filled with supreme delight;
In the morning he sat in audience,
All spoke words of reverence.
Then sounded the royal music loudly,
It sent forth its loud, shrill cries,
They summoned dancing women,
The nobles came to make obeisance.
Many jewels shone,
White, blue, and crystal,
They offered gifts of many sorts,
They all stood group by group.
Quṭbu-l-mulk made his petition,
Asked for two nobles to be called,
Then Muẓaffar Khān was presented,
The Lord of the World conferred favours,
Gave the title of the very utmost degree,
"Khān Jahān" with "Bahādurī":
Raḥmat Khān, bravest of the brave, attended,
And received the title of Mutaḥawwar Khān.
Then the king bestowed gifts,
Rewarded all the nobles,
Gave elephants, fierce in battle,
'Irāqī horses with saddles.
Auspicious robes of honour glistened,
Made the assembly a golden garden,
Turban ornaments glittered, plumes fluttered,
Lovely jewelled bands and trappings,
Jewelled swords were displayed,
The whole army was covered with jewels;
On that spot they made four halts,
All the army took repose.
Then began again the long marches;
Where stands the town of Shāh Madār,
There the lord of the army arrived,
And worshipped the wonder-working saint,
Some ten days they halted there,
Many gifts were given in the audience hall,

Gitā Chand (695–894).

695 Again Mīr Jumlah, the hero, forwarded thence a report,
The runner with paper in hand came to the darbār door,
Mumtāz K̲h̲ān took the writing, delivered it to the king,
Taqarrub K̲h̲ān took it, and forthwith read out the contents.
The clever agent of the Wazīr, Sayyid ‘Abdullāh K̲h̲ān,
700 The *Kāyath*, Siroman Dās Rāe, lord of Sānḍī town,
Frequenting the audiences of Mu‘izzu-d-dīn he learnt the truth,
He wrote to Quṭbu-l-mulk all the news of importance.
“Here Mu‘izzu-d-dīn, puffed-up, maddest of the mad, goes on drinking,
“All the musicians are made nobles, they do what their heart desires,
705 “At every moment in their mind arises joy for some brother,
“Who has got fish-dignity, flag, hand, yak-tail, and kettle-drums.
“They load with wine, their bullets are opium pills,
“Long and short drums are their cannon, long horns replace muskets,
“Instead of a gun-match they fill cups, they conquer floods of *bhang*,
710 “Night and day are thus noised abroad their plans for war and battle-field.
“All the lily-eyed, pain-quelling beauties are collected,
“The cleverest dancers wave in the hall their dusky locks,
“Passion kindles by their songs, he hears sweet poet's rhymes,
“He beholds attentively the dances of the pretty juggler boys.
715 “Here a group of drunken players, there the overtures of loose women,
“Here dance joyous eunuchs, moving with great quickness,
“There boys run about, making the *darbār* a sodomites' resort,
“This is Mu‘izzu-d-dīn's madness, he attends to nothing else.
“Power is usurped by Kokaltās̲h̲ K̲h̲ān and Ẕū'lfiqār K̲h̲ān,
720 “Both attend the *darbār*, there is great enmity between them,
“As a sick man shuts his eyes and gulps down bitter juice reluctantly,
[Line wanting in original.]
“Brave G̲h̲āzīu-d-dīn K̲h̲ān and Muḥammad Amīn K̲h̲ān have been gained,
“‘Abdu-ṣ-ṣamad K̲h̲ān, Qamru-d-dīn K̲h̲ān, Zakariyā K̲h̲ān, have come over,
725 “Then Raḥīm K̲h̲ān and all the Tūrānīs have been got at.

" They have made Mīr Jumlah referee, will join and fight for him.
" One day Mu'izzu-d-dīn sat, streams of wine were flowing,
" Full of happiness to his heart's desire, he gave new orders for each day ;
" In the midst of this came the news,—'Farrukh Shāh is at Kannauj,
730 " ' And 'Izzu-d-dīn has fled, taking with him all his army.'
" Hearing of 'Izzu-d-dīn's flight, that all his army had fled,
" The whole drunken gathering was forthwith immersed in sorrow,
" Then began their mouths to burn as if poisoned, the songs sounded like curses,
" Their drunken joy subsided, thought and fear and anger awoke.
735 " It is too much to write all the story, nothing received attention,
" Perturbed, the musicians made 'rain,' the queen went into a swoon,
" Drums of sorts were dropped, they forgot their cymbals and rattles,
" Drunkenness vanished, the wine-cups dropped, the tunes stopped, they cried and groaned.
" Mu'izzu-d-dīn was exceeding wroth, time after time he talked wildly,—
740 " ' This affair has mis-carried because I made a child into a leader,
" ' Furthermore, power was granted to a group of injudicious nobles,
" ' My mind conceived not wise plans, the defeat is through my own error.
" ' Khwājah Ḥusain knows naught of war, nor the intricacies of affairs ;
" Where did Luṭfullāh Khān ever fight, he of Pānipat, the True One ?
745 " ' With them went many others, none of whom could give advice,
" ' Among them who was skilled to overcome the Sayyid in battle array ?
" ' Now I start with my followers, say, who will stand fast, and how ?
" ' Hearing of my approach the whole army will fall to pieces,

"'All the dew, every drop of it, is dissipated by the risen sun;
750 "'I will not spare one rebel; who will there be to appear in the field?
"'Now to-morrow I will run and arrive with all my followers,
"'Not one will be let go alive, I have thrown down the door of audience,
"'Like a tiger I will devour their flesh, I will divide them into little bits,
"'Then rooting up Bārah brick by brick, I will throw it into the water.
755 "'By my strong arm I obtained superiority over the Princes,
"'By strength of sword, by strength of war I became lord of Hind,
"'Defeating three Kings in battle, I took the sovereignty,
"'He claims the throne and to seize Dihlī by stratagem.'
"This order was sent, when the runaway reached Āgrah,
760 "'Stand fast there all together, seize all the fords and ferries,
"'Quickly erect three strong bridges below Bālambhpur,
"'I come by forced marches, collect supplies for a campaign.'
"He sent for his *Bakhshī* and said;—'Make ready the horsemen,
"'Count out to all a two months' advance, give them supplies,
765 "'Send off the quarter-master-general, then see to every place,
"'Make such plans that you may start in good order this night.'
"Next orders issued to send for all the nobles near at hand,
"He enforced on them the order, they must move that very night;
"As morn arose the whole army must gather in splendour,
770 "Must hurry on to Āgrah and occupy Iṭāwah,
"As soon as the order went forth, at once arose confusion and shouts in the city,
"The nobles armed, the horsemen made ready, at dawn the kettle-drums sounded;
"When he himself mounted, thick clouds gathered, great dread arose;
"It was an ill omen, all said—'Alas! Kālī is angry'!
775 "On the right a kite called, in front to the left a crow croaked,
"And a cow's throat was cut, cats spat, and wrangled,
"The standard caught, the staff broke, a very bad omen,
"When Mu'izzu-d-dīn started, evil omens succeeded each other.
"In daylight an owl screeched amidst the camp, and foxes called,
780 "Here a dog howls like a *surani*, there a pack of jackals yells,

"Groups of vultures whirl over their heads, this is very unlucky;
"The soldiers in their dreams thought they fled all the night.
"With their heads all full of portents and evil omens,
"They speedily reached Āgrah, halted at Samūgaṛh;
785 "There came ‘Izzu-d-dīn and all the runaways,
"As to the hardships of the battle they invented many fables.
"Angrily spoke Mu‘izzu-d-dīn;—‘I will now pay out the Sayyids,
"‘When I have overcome the enemy, then I shall triumph over the Bārhah,
"‘All the trouble is their doing, rancour appeared in their hearts,
790 "‘I will fight them in every way and try conclusions with them.
"‘Sādāt K̲h̲ān, acting out of spite, obeys his kinsman's word,
"‘Farzand K̲h̲ān, his son, galloped in front of all the army,
"‘The man called Ṣamṣāmu-d-daulah, his sword I will splinter;
"‘In battle-field against me who will now venture to stand?
795 "‘At first Chabīle Rām attended ‘Izzu-d-dīn's court,
"‘Then went off to the other side, the wretch, and deceived me,
"‘Also ‘Alī Aṣg̲h̲ar K̲h̲ān came, then marched away to the others,
"‘Thought lightly of Mu‘izzu-d-dīn. Behold their hearts’!
"Saying this he paraded his army, there were five *lakhs* of horsemen,
800 "When naming *lakhs*, two lords of elephants count as many thousands,
"Then he discharged his cannon, the sky was hidden by smoke,
"Earth's axis yielded, Meru was rent, such was the strength of this army."
Thus wrote Siroman Dās Rāe, ordered it to be carried quickly thither;
The letter-carrier reached the audience-hall of Quṭbu-l-mulk,
805 The contents were read aloud clearly by Ṣāhib Rām, Māthur;
Hearing it his eyes reddened, his mind was overcast with rage.
Laughing spoke ‘Abdullāh K̲h̲ān, "That king is very aggressive,
"If I now get the auspicious order of the king of kings,
"Farrukh̲siyar's good fortune and God's grace being inseparable,
810 "This very day I rush to battle and break the strength of Mu‘izzu-d-dīn's arm."

On hearing the news he made a resolve, he went the rounds,
His retinue having been made ready, the Sayyid rode forth,
Joyous, with hand on moustache, he went to see the king,
Reported everything, made glad the heart of the king of kings.
815 What Mīr Jumlah wrote in his report to the Sayyid Wazīr,
Both were of like contents, the degradation of lord and noble;
The eyes of the World Lord were filled with heroism, the steadfast in battle,
His sword trailing at his side, the hero's hand played on his moustache till it bristled,
When the lord of all the Bārhahs, the hero, Sayyid and Wazīr, had told his tale,
820 Came Muḥammad Khān, Bangash, and joined with new equipments,
Twenty thousand mail-clad horse came, looking like a cloud,
All heroes and strong, all hard of heart and hand.
Then king Farrukh gave him orders: "I have decided to march,
"Muḥammad Khān! parade your men and march at once,
825 "To go with you brave fighting nobles and all things are ready,
"Arslān Khān has got out the advance tents, and starts to the front this very day."
The retinue was made ready, at dawn the king of kings mounted,
Then came Muḥammad Khān, verified twenty thousand horse,
He was made a *panj-hazārī*, all his officers became *manṣabdārs*,
830 They joined the vanguard, the hero hurried to the front.
March by march they hurried on, quickly came to Āgrah,
Both strong armies drank Jamnā's waters below Bālambhpur,
They met face to face on opposite banks, both armies pitched their tents,
These wished to cross and attack, those on that side held all paths and passages.
835 On both sides the drums resounded, all the waters were moved and trembled,
On both sides flags fluttered, the pennants blazed to the stars,
The royal tents, lustrous as the cars of the gods, hid out the heavens,
Throughout both armies were thousands of brisk movements, the horses stamped their hoofs.

On both sides handsome tents, like suns and peacocks, delight the eye,
On both sides cannon are fired, keeping up their thunder,
On both sides all kinds of crash and thump set up all sorts of sounds,
On both sides, night and day, the bullets and rockets fall like rain-drops.
Both sides are full of spirit, with eager desire for the contest,
Both desired to cross and try their fortune, one constantly harassed the other;
As they draw near, the armies of the two Dilhī lords leap and bound,
The waves of the great river were restless, the waters grieved for both.
At this time the hero, Sayyid and Wazīr, reported as soon as he came,
"My lord! Incarnation of Deity! they have come to tell us of firm ground,
"Not far to the west of Āgrah, the Jamnā has been forded,
"It can be forded right across." Hearing, the king's heart rejoiced.
They made up a story, spread rumours that Mu'izzu-d-dīn had crossed,
This was noised on all sides, the strong, bold army made ready,
Sending some men to face the enemy, the king of kings stood ready,
In the night rushed the Sayyid, then shivering and shaking crossed over.
The army standing in the enemy's face to bar the way was recalled,
It marched some four *kos*, and for three or four hours halted,
When the morning dawned, both parties mounted, with music playing,
In great haste the Lord of sword and bow came to the Jamnā crossing.
When the strong, valiant army arrived, the lucky time was fixed,
It was a swift stream, very powerful, full of tricks, hundreds of twists and turns,
The heaven-seated court fixed a bridge on the ocean,
First they found firm ground through the water, then they crossed the stream.

In this way the king of kings crossed the Jamnā without hindrance,
Then next day at dawn, a *kos* or two east of Sikrandah,
865 In that place, near the river, the hungry army pitched its tents;
Learning their approach, confusion fell on Mu'izzu-d-dīn's army.
Hearing this news, Mu'izzu-d-dīn's mind was filled with rage,
He talked idly, "Friends, behold! now I rush and take him alive,
"Not one rebel shall escape, drawing I seize every one,
870 "I will torture those who have had the effrontery to join him."
So saying he rolled his eyes, drew his dagger from its sheath,
Flourishing his sword, trembling with rancour, twisting his moustaches, full of rage,
Sheathing every limb in armour, he mounted a war elephant,
The deep drums rumbled, in fear and trembling the fixed-pole turned on its axis.
875 Five lakhs of fighters followed, filled with eagerness for battle,
All clad in hauberk and breast-plate, themselves hard as steel through and through,
Thus the heroes passed the night, then marched forward south of Āgrah,
Then as morn broke, they hastened to their camp at Sikandrah.
The field of battle lay between, the two armies were some two *kos* apart,
880 These on the east side, and on the further side from the east in splendour
Both heroes shouted with joy, along with their nobles,-
Then at dawn moved to slay their enemy, like the waves of Jamnā,
Wednesday, the full moon of Pūs, *Sambat* seventeen sixty-nine,
In the year eleven hundred and thirty-three, the fourteenth of Muḥarram month,
885 And of the imperial month Āẕar the twenty-third, Çrīdhar avers,
The lucky hour for battle was fixed, the Lord of the World approved it.
Then next day for six hours Krishen sent rain in torrents,
When the clouds dispersed, the Sun Lord joyfully struck up his drums,

The army followed the hero and noble, the Sayyid Wazīr, as he did this,
890 Entirely filled with the joy of battle, he made the first venture into the battle-field.
Then the heroes mounted and stood, all the horsemen followed and stood,
Wherever troops were needed, thither they were despatched,
All the groups advanced, the king's camp was filled like a river,
The sun hastened, the tortoise trembled, the snake-king lost his strength.

Bilās Chand (895–999).

895 Receiving the king's orders with shouts,
Quṭbu-l-mulk rode to the right,
Followed by the steel-clad heroes,
Death-dealing and death-receiving warriors.
The Sayyid was followed by all the death-dealing warriors, full of efforts,
900 On the king's order they drew their swords, shouted, "Strike, Strike," roared hoarsely,
Throwing down their reins, full of courage they galloped their horses into the battle,
The big drums of 'Abdullāh Khān, the Sayyid, boomed deep and loud to the south.
Dilāzāk, Lodī, Lohānī,
Pannī, Tarīn, Sūr, Sarwānī,
905 Dāūdzāī, Khweshgī, Gabī,
Mahmand, Biṭṭanī, Pabī,
Biṭṭanī, Pabī, Mattī, Gabī, holding their Arab horses,
Clad in breastplate and shirt of mail, full of heart, joint in death or victory,
Youthful, bold Pathāns, iron-covered, renders of mountains, in crowds,
910 Thus with 'Abdullah Khān advanced the hero Muḥammad Khān, the Bangash.

[Lines 911–999 deal with episodes in the battle, introducing in each stanza the name of some chief. About twenty-eight men are mentioned, the only verse of special note is one (951–958) bringing in some tribal names:

Gutrānī, Tarīn, Tīrāhī,
Sarwānī, Mattanī, Enwāhī,
Nassur, Giljī, Kāsab, Kākar,

Arab, Sūr, Niānjī, Nāgar,
In front the Bhanār, Kāsi, Āgar, Panī, Ujāgar, Roshānī,
Mahmand, Biṭṭanī, Jepharmanni (?), Chabī, Lodī, Lohānī,
Bakhtiyārī, Rohelah, Yūsuf-khailī, Dilāzāk, and Sarwānī,
These formed the brave array of Zainu-d-dīn Khān, the Dāūdzāī.

Then the metre changes to *Doharā* (1000–8), and two more names occur, those of the Nāgar leaders. Again from lines 1009–1248 we change to *Kavitta*, the verses being of the same character, the heroes of them being chiefly Chabīla Rām, Ṣamṣāmu-d-daulah Khān Daurān, Sādāt Khān and Amīr Khān with their relations and followers. One verse will suffice as a specimen :

1109 Delighted, the Pure Master bestowed instantly the whole earth's wealth,
1110 By describing a giver of gold to the needy and wretched you name his full titles,
The big drums of continuous charity beat at his door loud and deep,
Of Mumtāz Khān, the strong, the hero, thus speaks, Çrīdhar the Poet.

[From 1113 to 1248 there are stanzas devoted each to the praise of one man, his relations or followers. The poet exerts himself to give each some special praise but necessarily falls into a good deal of repetition. The metre then changes.]

Hīra Chand (1249–1308).

1249 Then Mu'izzu-d-dīn waxed wroth,
Put on all sides active troops,
In the vanguard Kokaltāsh Khān,
Strong, alert, heroic, used to victory.

[In a similar manner the names of various nobles are introduced into the next fourteen verses (1253–1308).]

Harigīta Chand (1309–1464).

1309 On both sides the armies were ready, shouting the fighters stood,
1310 Then beat the kettle-drums on the elephants, the haughty north-pole trembled,
A mist spread, white as milk, the sun's brightness was hid,
Meru tottered and stooped, its sides moved, its very being was threatened.

On both sides the splendid armies were emulous in the battle-waves,
Elephant-pieces, cannon, rockets, often kindled, thundered inexpressibly,
1315 Fire-locks raised dust and darkness, both sides fired all their field-pieces,
Next spoke uncounted matchlocks, then the faithful fell in heaps,
The field-pieces went off "kar, kar, karā, kar," striking with a sharp blow,
On all sides the drum-beats rolled, smoke and dust floated, with great heat,
Many rockets sped like lightning, the bullets struck like hail,
1320 No one's garb could be seen, whether the fighter was of your side or the other.
Then the veil of mist lifted, to both sides it was like the dawn,
The valiant nobles and heroes shouted, they took their bows in their hands,
They galloped onwards, their reins moved like stormy waves,
Loud cries arose, "Strike, Strike, Strike," a darkness covered the field.
1325 Their arrows flew "tar-tar," rockets hissed "sar-sar," bullets whistled "bhar-bhar,"
With foot advanced, onward and onward went many excellent heroes and lords,
The valiant with reddened faces, full of joy, the cowards all pallid and trembling,
Just as seeing a beggar the generous look happy, the miser, uneasy and displeased.
On both sides, in both armies, brave fought with brave most bravely,
1330 The scamps were driven off by the valiant forcibly, hero fought with hero,
Swords whirled, scimitars were grasped, the heroes cut heads open,
With a flash came a wound; how many fell smarting!
[Lines 1332–1432, these describe the doughty deeds of each leader, one by one, but do not advance the story.]
1433 Death giving and taking, the field-pieces and elephant-guns roared and sounded,
There was a tempest of matchlocks, the strong rockets twisted about,

1435 There arrows, eager, bewildering, brought to many the hoped-for mercy of Paradise,
The sky-chariot of the sun reached its setting, the time was clouded.
Then hero struggled with hero, with angry looks brave strove with brave,
Cries arose, "Strike, Strike, Strike," shouting they fell in heaps,
The loyal, comely Arabs, the comely heroes, stood fast,
1440 Where there is meeting and assembly how could they turn away their faces.
[Lines 1441–1452 are devoted to a recital of the names of fighters.]
1453 Everywhere the armies, full of zeal, caused much slaughter,
Weapons, heavy, two-edged, numerous, fell like torrents of rain,
1455 Chain-mail, vizor, helm were beaten soft, the plates of the fish-scales fell off,
Calling "Strike, Strike," hearing "Stand fast, friend, stand fast," they made effort.
Growling and dark like lowering clouds the proud army moved in circles,
Great drums roared and rattled, drawn swords glanced and glittered,
With a swish fell the arrows, bullet upon bullet came like hail at that time,
1460 A mire of brains collected, when the Sayyid drew his sword.
He stands full of anger, tossing his head, causing many wounds, holding his ground,
Heads are lost, ears drop, bodies were collected in mounds,
Blood began to flow in rivers, the stream began to flow on,
The flesh-rending arrows carried destruction wherever they fell.

Kavita Chand (1465–1576).

1465 When waves expand day by day, how can the poet keep count, 'tis the work of the mad-like fighters,
To the edge of the snowy hills he drives the invader, who can come that he overcomes not at will,
The well-named leader, the loved lord of prowess, the great chief and peerless,
Of the famous king, Lord Shatrusāl, great, brave, liberal, he tells the lustre.

[1469–1532, Chattarsāl, Muṣliḥ Khān and some others are introduced. We draw near to the end of the battle.]
1533 King Farrukhsiyar and Jahāndār Shāh both fought for the throne in front of Āgrah,
The conqueror beats his drums, the defeated fled, the warriors forgetting all turned their bridle-reins,
1535 Resolutely, verily diverting rivers, did A'ẓam Khān, strong and loyal, uphold the cause of his king,
As in the Mahābhārat the weak king was chased away by Bhīm, strong of arm, at Kurukhet.
[Lines 1537–1544 give the praises of A'ẓam Khān.]
1545 To see Farrukhsiyar, the conqueror, full of delight at Mu'izzu-d-dīn's defeat,
Beating drums, turning his reins, came Chabīla Rām
[Māri par dal har khāyo jūth jogini ko karat baḍāi siwā saṅkar hilākh hai]
One hero many thousands has slain in one moment, counting them one.
[Lines 1549–1576 relate various phases of the fighting, and introduce the names of many leaders. A *dohā*, 1577-78 is of the same nature.]

Kavita (1579–1632).

[Lines 1579–1598 are mere catalogues of names.]
1599 A festival of joy and gladness heightened the delight of all, the colour of things had brightened,
1600 Thy reign adds lustre to sovereignty, the fruit of fortune and felicity;
The happily-named king of kings, Farrukhsiyar, the man of the lucky star,
In his day the throne was adorned, when he sat on the throne, the good fortune of that throne was enhanced.
Shaking the south, conquering west and east, this unparalleled man has come with strong hand,
The fortunate king of kings, Farrukhsiyar, has brought the seven isles within the realm of Hind,
1605 Daily he increases, also the Faith, he has extended his sovereignty over faith and the world,
When a king is adorned with sovereignty, he should thus obtain it.
His horsemen herded them like a flock of sheep, the army rent, he robbed the nest of A'azzu-d-dīn,

Rushed from the east, scared away like starlings the army of the pretender, Mu‘izzu-d-dīn,
The fortunate king of kings, Farrukhsiyar, defender of the two faiths;
1610 From realm to realm ran the news of victory, the haughty feared, the humble were enraptured,
Some pod, some pea free from weevil, some one not the slave of a harlot,
Handsome, graceful, brave, excellent, young, a man beyond compare,
Fortunate, a second King Akbar, has Farrukhsiyar obtained sovereignty,
He wields sovereign strength, to see him is delight, wearing the garland of victory.
[The remaining lines are devoted to Najmu-d-dīn ‘Alī Khān, Sayyid Anwar Khān, Sarbuland Khān, and Mīr Mushrif, ending with line 1630.]

NOTES.

Line 18, the allusion is to ‘Aẓīmu-sh-shān, Farrukhsiyar's father. —l. 145, *ādam* for *āmad*, (Persian) "coming, approach,"—l. 394. This is the *‘Īd* of the 1st Shawwāl, 1124 H.=31st Oct., 1712. According to Kāmwar Khān, the prince observed the *‘Īd* on the right bank of the Ganges, opposite Benares, and crossed the river on the 2nd Shawwāl. Farrukhsiyar was at Jhūsī on the 13th (12th November, 1712)—ll. 411, 413, Kumwarpur and Bindukī are both named by Kāmwar Khān; Fatḥābād is probably a name for Kajwah—l. 422. The "battle-pillar" is possibly an allusion to the *ran-khambh*, a wooden post said to have stood in the midst of the Kurukhet at Thānesar—l. 615, I have failed to make anything of this line——l. 706, "hand" =*panjah*, the figure of an open hand, one of the honorary distinctions granted by the Emperors—l. 744, *Sāṁchuhai*, "the true one," a Hindī equivalent of the epithet *Ṣādiq*, borne by Luṭfullāh Khān, in token of his descent from one of the twelve Imāms, Ja‘faru-ṣ-ṣādiq.—l. 780, *Suranī*, a long horn, to the sound of which a dog's howling may well be likened. ll. 883–85. Not only do these dates seem wrong, but they are hopelessly irreconcilable with each other. If we take the day of the week, Wednesday, as correct, then the battle was fought on the 11th January, 1713, N.S., which by the usual computation agrees with the 13th Ẓu'l-Ḥijjah 1124 H., the date given by the historians. The 14th Muḥarram (1125) was a Thursday or Friday, not a Wednesday. As for the *tetisā* (33) of the text, this may be a clerical error for *teīsā* (23); but the latter year (1123 H.) is equally impossible, for Bahādur Shāh did not die till the 21st Muḥarram, 1124 H., more than a year afterwards. Then the *Saṁbat* year 1769 began, according to Cunningham's tables, on the 28th March, 1712, and Pūs pūranmāsī, being the 280th day, comes out as the 1st January, 1713 (3rd Ẓu'l-Ḥijjah 1124 H.), or ten days too early. Nor does the poet's Mahomedan date, 14th Muḥarram, agree, as will be seen, with this *Saṁbat* date. So with the Ilāhī era. Āẕar being the 9th month, and the year beginning on the 20th March, the 23rd of that month is the 270th day of the year, equivalent to the 15th December, 1712, agreeing neither with the Hijra nor Sambat date. I make out the synchronism, to be, 13th Ẓu'l-Ḥijjah 1124 H. = 22nd Day of the Ilāhī era = S. 1769, Māgh badi 10th = 11th January, 1713.[*] Khāfī Khān, II, 721, has 13th Ẓu'l-Ḥijjah = 19th Day.—ll. 905, 906, I am not sure whether *Gabī* is a tribal name, or a mere epithet used to fill out the line. The Pabbī are a sub-division of the Afrīdīs, *see* "Dictionary of the Pathan Tribes," Calcutta, 1899.—l. 1547, I can make nothing out of this line.

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[*] [By Prof. Jacobi's Tables, published in *Epigraphia Indica*, Vol. i, pp. 443 ff., I find that *Samvat 1769, full-moon day of Pūs* fell on Wednesday, 11th January, 1713, N.S., as required. *Māgha vadi 10* corresponds to Sunday, 22nd January, 1713, N.S., according to the *pūrṇimānta* scheme of lunar fortnights, or to Monday, 20th February, 1713, N.S., according to the *amānta* scheme of lunar fortnights.—Ed.]

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A New Copper-plate Inscription of Lakṣmaṇasena.—By BABU AKSHAY KUMAR MAITRA, B.L.

[Read, June 1899.]

The copper-plate — bearing this Inscription, was discovered in the month of Bhādra 1898, in the village of Anulia, near Ranaghat, in the District of Nadia. It has been edited previously in my journal, the *Aitihāsika Citra*, by Pandit Rajanikanta Cakravartti of Maldah. I now re-edit it from the original plate.

The plate measures $13\frac{1}{4}''$ by $12\frac{1}{2}''$ and bears on both sides a Sanskrit Inscription in 56 lines partly in prose and partly in verse. The writing is of the Bengali variety of the North-East Indian Alphabet of the 12th century and intimately agrees with the characters of the other well-known documents of the Sena Dynasty. The spelling is on the whole very correct, and no remarks as to orthography are called for. The seal, bearing the image of a ten-armed deity, is attached to the top of the plate.

The Inscription opens with the words *Oṁ! Namo Nārāyaṇāya*, and an invocation to Çambhu and the Moon, after which the well-known genealogy of the Sena Kings from Hemanta to Lakṣmaṇasena is recorded in exactly the same words as in the Tarpan Dighi Plate,[1] but with this exception only that instead of verse VIII of the Tarpan Dighi Plate, three other verses are added (ll. 18–24) in praise of the liberality and bravety of Lakṣmaṇasena, which, however, do not mention a single historical fact.

The object of the Inscription is to record a grant made by *Lakṣmaṇasenadeva*, who is styled as *Parameçvara-Paramavaiṣṇava-Paramabhaṭṭāraka-Mahārājādhirāja* and who is described as meditating over the feet of *Mahārājādhirāja-çrī-Vallālasena*. The grant was made by him while he was staying at his camp in *Vikramapura* (ll. 27 ff.), and consisted of a portion of a field in Matharaṇḍiyā (*Mātharaṇḍiyā-khaṇḍa-kṣetra;* l. 38) which is described as lying in *Vyāghrataṭī*, a place or district belonging to the *bhukti* of *Pauṇḍravarddhana* (ll. 37 ff.). This piece of land was given to a Pandit, *Raghudevaçarmman* by name, the son of *Devadāsadevaçarmman* and grandson of *Çaŋkaradevaçarmman*, and great-grandson of *Vipradāsadevaçarmman*, who belonged to the *Kauçika-gotra*, and studied the *Kāṇva-çākhā* of the Yajurveda (ll. 70 ff.).

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[1] Edited in *this Journal*, Vol. XLIV, for 1875, Part I, pp. 1–15, with two facsimile Plates. Another copper-plate of Lakṣmaṇasena has been discovered last year at Madhainagar, near Serajganj, in the Pabna District. It is, however, yet unedited.

The grant was made on the 9th day of Bhādra, in the 3rd year of Lakṣmaṇasena's reign (l. 56). This date taking the year **1119 A.D.**, the epoch of the Lakṣmaṇasena Era, as the beginning of his reign, corresponds to A.D. 1121-22. The Minister for piece and war, *Nārāyaṇa-datta*, acted as *dūtaka* (ll. 54-55).

Historically we gather no new information from this inscription. I am unable to identify the exact position of the localities mentioned in the grant.

I now edit the Inscription from the original Plate :—

Obverse :

(l. 1,) Oṁ namo Nārāyaṇāya ॥ Vidyud[1]=yatra maṇi-dyutiḥ phaṇi-
pater=vvā(bbā)lendur=indr-āyudhaṁ vāri
(l. 2,) svargga-taraŋgiṇī sita-çiro-mālā valāk-āvaliḥ | dhyān-
ābhyāsa-samīraṇ-opani-
(l. 3,) hitaḥ çreyo-ŋkur-odbhūtaye bhūyād=vaḥ sa bhav-ārtti-tāpa-
bhiduraḥ Çambhoḥ kapardd-āmvu(mbu)daḥ ॥
(l. 4,) Ānando=mvu(mbu)-nidhau cakora-nikare duḥkhacchid=
ātyantikī kalhāre hata-mohatā Rati-
(l. 5,) patāv=eko=ham=ev=eti dhīḥ | yasy=āmī amṛt-ātmanaḥ
samudayanty=āçu prakāçāj=jagaty=A-
(l. 6,) trer=dhyāna-paramparā-pariṇataṁ jyotis=tav=āstām=mude ॥
Sev[2]-āvanamra-nṛpa-koṭi-kirī-
(l. 7,) ṭa-rocir-amv(mb)-ūllasat-pada-nakha-dyuti-vallarībhiḥ |
tejo-viṣa-jvara-muṣo dviṣatām=a-
(l. 8,) bhūvan bhūmībhujaḥ sphuṭam=ath=auṣadhi-nātha-vaṁçe ॥
Ā[3]-kaumāra-vikasvarair=ddiçi di-
(l. 9,) çi prasyandibhir=ddor-yaçaḥ-prāleyai ripu-rāja-vaktra-
nalina-mlāniḥ samunmīlayan | He-
(l. 10,) MANTAḤ sphuṭam=eva Sena-janana[4]-ksetr-augha-puṇy-āvalī-
çāli-çlāghya-vipāka-pīvara-guṇas=te-

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[1] Metre : Çārdūlavikrīḍita ; and of the next verse.
[2] Metre : Vasantatilakā.
[3] Metre : Çārdūlavikrīḍita.
[4] The second *na* has been inserted later.

(l. 11,) ṣām=abhūd=vaṁçajaḥ ॥ Yadīyair[1]=ady=āpi pracita-bhuja-tejas-sahacarair=yaçobhiḥ çobhante

(l. 12,) paridhi-pariṇaddhā iva diçaḥ | tataḥ kāñcī-līlā-catura-catur-ambhodhi-laharī-parīt-orvvī-

(l. 13,) bharttā=jani VIJAYASENAḤ sa vijayī ॥ Pratyūhaḥ[2] kali-sampadām=analaso vedāya naik-ādhvagaḥ

(l. 14,) saŋgrāmaḥ çrita-jaŋgam-ākṛtir=abhūd=VALLĀLASENAS=tataḥ | yaç=cetomayam=eva çaurya-vijayī

(l. 15,) da[t*]tv=auṣadhaṁ tat-kṣaṇād=akṣiṇā racayāñ=cakāra vaçagāḥ svasmin pareṣāṁ çriyaḥ ॥ Sambhukt-ā-

(l. 16,) nya-dig-aŋganā-gaṇa-guṇ-ābhoga-pralobhād=diçām=īçair=aṁça-samarppaṇena ghaṭitas=tat-tat-prabhāva-sphu-

(l. 17,) ṭaiḥ | dor-uṣma-kṣapit-āri-saŋgara-raso rājanya-dharmm-āçrayaḥ çrīmal-LAKṢMAṆASENA-bhūpatir=a-

(l. 18,) taḥ saujanya-sīmā=jani ॥ Āmnāyaḥ praṇināya yāni munayo yāny=asmaran saṁstutāny=ā-

(l. 19,) cāreṣu ca yāni tāni dadire dānāni dainya-druhā | hrīṇattve ca tathā=py=anena niyamaṁ kā-

(l. 20,) leṣu saṁkhyātatāu=deyeṣv=artthinam=antareṇa ca phal-āçaṁsā-vidhau çṛṇvatā ॥ Samayam[3]=api sa-

(l. 21,) muddhataṁ numas=taṁ tad-asi-mah-auṣadham=udva(dba)bhūva yatra | bhavati para-pura-praveça-siddhiḥ kara-vi-

(l. 22,) dhṛte sakṛd=eva yasya mūle ॥ Yān[4] samva(mba)ndhya jagat-trayī-vitaraṇe mittrair=Vva(Bba)lir=vvāritoyaiḥ sa-

(l. 23,) ŋgamya na Gaŋgayā kṣaṇam=api svarggo=pi saṁsmaryyate | tān=uccair=atiçāyi-çāli-vasudhān=ā-

(l. 24,) rāma-ramy-āntarān=viprebhyo=yam=adatta pattana-gaṇān bhūmīpatir=vbhū(bbhū)yasa(ça)ḥ ॥ Sa khalu çrī-VI-

(l. 25,) KRAMAPURA-samāvāsita-çrīmaj-jaya-skandhāvārāt | Mahārājādhirāja-çrī-VALLĀLASENA-

(l. 26,) DEVA-pād-ānudhyāta-Parameçvara-Paramavaiṣṇava-Pa[ra*]mabhaṭṭāraka-Mahārājādhirāja-çrīma-

(l. 27,) l-LAKṢMAṆASENADEVAḤ kuçalī samupagat-āçeṣa-rāja-rājanyaka-rājñī-rāṇaka-rājapu-

(l. 28,) tra-rājāmātya-purohita-mahādharmmādhyakṣa-mahāsāndhivigrahika-mahāsenāpati-

Reverse :

(l. 29,) mahāmudrādhikṛta-antaraŋgavṛ(bṛ)haduparika-mahākṣapaṭalika-mahāpratīhāra-mahā-

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[1] Metre : Çikhariṇī.
[2] Metre : Çārdūlavikrīḍita ; and of the next two verses.
[3] Metre : Puṣpitāgrā.
[4] Metre : Çārdūlavikrīḍita.

(l. 30,) bhogika-mahāpīlupati-mahāgaṇastha-daussādhika-cauroddharaṇika-nau-va (ba)la-ha-

(l. 31,) sty-açva-go-mahiṣ-ājāvik-ādi-vyāpṛtaka-gaulmika-daṇḍapāçika-daṇḍanāyaka-viṣa-

(l. 32,) yapaty-ādīn । anyāṁç=ca sakala-rāja-pādopajīvino ऽdhyakṣa-pracār-oktān=ih=ākī-

(l. 33,) rttitān । caṭṭa-bhaṭṭa-jātīyān janapadān । kṣetrakarāṁç=ca vrā(brā)hmaṇān vrā(brā)hmaṇottarān yathā-

(l. 34,) rhaṁ mānayati vo(bo)dhayati samādiçati ca । matam=astu bhavatāṁ । yathā çrī-PAUṆḌRAVARDDHANA-bhukty-antaḥ-

(l. 35,) pāti-VYĀGHRATAṬYĀM । pūrvve açvattha-vṛkṣaḥ sīmā । dakṣiṇe jala-pillā sīmā । paççime Çā-

(l. 36,) ntigopī-çāsanaṁ sīmā । uttare mālāmañca-vāṭī sīmā । itthaṁ catuḥ-sīm-āvacchinnaṁ vṛṣabha-ça-

(l. 37,) ṇkara-nalina-sakākinika-sapta-triṁçad-unmān-ādhik-āḍh-āvāp-ānvita-nava-droṇ-ottara-bhū-pāṭa-

(l. 38,) k-aik-ātmakaṁ saṁvatsareṇa kaparddaka-purāṇa-çat-aik-otpattikaṁ MĀTHARAṆḌIYĀ-KHAṆḌA-KṢETRAṀ sa-jhā-

(l. 39,) ṭa-viṭapaṁ[1] sa-jala-sthalaṁ sa-gartt-oṣaraṁ sa-guvāka-nārikelaṁ sahya-daç-āparādhaṁ parihṛta-sarvva-

(l. 40,) pīḍaṁ a-caṭṭa-bhaṭṭa-praveçaṁ a-kiñcit-pragrāhyaṁ tṛṇa-yūti-gocara-paryantaṁ VIPRADĀSADEVA-

(l. 41,) ÇARMMAṆAḤ prapauttrāya ÇAṆKARADEVAÇARMMAṆAḤ pauttrāya DEVADĀSADEVAÇARMMAṆAḤ puttrāya Kau-

(l. 42,) çika-sagotrāya Viçvāmitra-Va(Ba)ndhula-Kauçika-pravarāya Yajurvveda-Kāṇva-çākh-ādhyāyi-

(l. 43,) ne Paṇḍita-çrī-RAGHUDEVAÇARMMAṆE puṇye ऽhani vidhivad=udaka-pūrvvakaṁ Bhagavantaṁ çrīman-Nā-

(l. 44,) rāyaṇa-bhaṭṭārakam=uddiçya mātāpitror=ātmanaç=ca puṇya-yaço ऽbhivṛddhaye[2] utsṛjya ā-

(l. 45,) candr-ārkkaṁ kṣiti-sama-kālaṁ[3] yāvat bhūmi-cchidra-nyāyena tāmraçāsanī-kṛtya pradattam=asmā-

(l. 46,) bhiḥ । Tad=bhavadbhiḥ sarvvair=ev=ānumantavyaṁ । Bhāvibhir=api nṛpatibhir=apaharaṇe nara-

(l. 47,) ka-pāta-bhayāt pālane dharmma-gauravāt pālanīyam । Bhavanti c=ātra dharmm-ānuçaṁ-

(l. 48,) sinaḥ çlokāḥ । Bhūmiṁ[4] yaḥ pratigṛhṇāti yaç=ca bhūmiṁ prayacchati । ubhau[5] tau puṇya-

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[1] This reading has been first pointed out by Prof. Kielhorn in Epigraphia Indica, Vol. V, p. 185, note 1.

[2] Read *puṇya-yaço-bhivṛddhaye*, without *avagraha* sign.

[3] Read *ā-candr-ārkka-kṣiti-sama-kālaṁ*.

[4] Metre: Anuṣṭubh (Çloka); and of the next two verses.

[5] The letter *u* has been added later.

(l. 49,) karmmāṇau niyataṁ svargga-gāminau ॥ Sva-dattāṁ para-dattām=vā yo hareta va-
(l. 50,) sundharām । sa viṣṭhāyāṁ kṛmir=bhūtvā pitṛbhis=saha pacyate ॥ Āsphoṭayanti
(l. 51,) pitaro valgayanti pitāmahāḥ । bhūmi-dātā kule jātas=sa nas=trātā bhavi-
(l. 52,) ṣyati ॥ Iti[1] kamala-dal-āmvu(mbu)-vindu-lolāṁ Çriyam=anucintya manuṣya-jīvitaṁ ca |
(l. 53,) sakalam=idam=udāhṛtaṁ ca vuddhā(buddhvā) na hi puruṣaiḥ para-kīrttayo vilo-
(l. 54,) pyāḥ ॥ Çrīmal[2]-Lakṣmaṇaseno NĀRĀYAṆADATTA-Sāndhivigrahikam |
(l. 55,) Raghudevaçāsane ṣkṛta dūtaṁ bhū-maṇḍalī-va(ba)labhit ॥
(l. 56,) Saṁ 3 Bhādra-dine 9 mahāsāṁ ni ॥ çrīni[3] ॥

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[1] Metre : Puṣpitāgrā.

[2] Metre : Āryā.

[3] *Mahāsāṁ ni* probably is an abbreviation for *mahāsāṁdhivigrahikena nibaddham.* The last two syllables perhaps are the king's endorsement of the document.

The Manahali Copper-plate Inscription of Madanapāladeva.—

By Babu N. N. Vasu.

[Read, March 1899.]

The subjoined edition of a new inscription of Madanapāladeva has been prepared from a copper-plate kindly presented to this Society in 1899 by Mr. N. K. Bose, C.S., then Magistrate of Dinajpur. The plate on which the inscription is engraved, was discovered in excavating a tank in 1875 within a park of the village of Manahali,[1] in District Dinajpur, Bengal.

The Inscription consists of 58 lines of writing, engraved on the two sides of a single copper-plate, measuring 15¾″ by 16″. At the top of the plate the Seal is soldered on. It shows the usual emblem of the Pāla kings, *viz.*, the Buddhistic wheel of Law with a deer kneeling on each side, facing it. Below this we may still recognize the king's name: *Çrī-Madanapālaḥ*, and on the top of the seal traces of small Stūpa are still visible. The writing belongs to the Bengali variety of the Nāgarī Alphabet of about the 12th century; as compared with the earlier inscriptions of the Pāla Dynasty, it shows a marked development towards more modern forms. Its execution is on the whole done fairly well; in one place, however, it has been impossible to make out exactly the meaning of the letters; unfortunately, this passage contains the name of the village, granted by the king (ll. 32-33). The *avagraha* sign is frequently used in this inscription; final letters are marked by the sign of *virāma*, which, however, seems to have been left out by carelessness in some instances, where in order to avoid unnecessary corrections in the subjoined transcript the letter has been put down as final. In regard to orthography, I desire to draw attention to the spelling *ttajan*, for *tyajan* in l. 14; *prattarthi*, for *pratyarthi* in l. 24; and also *puṇair*, for *puṇyair* in l. 16. Instances of this kind may be taken as originating from a pronunciation of the compound letters *tya* and *ṇya*, which almost closely resembled the modern Bengali pronunciation of the same. The LANGUAGE is Sanskrit, and with the exception of the introductory benediction, (in line 1) and the portion containing the grant (lines 27–49), it is in verse. At the top of the inscription, we find the letter *ni* engraved four times in one line; this appears to be the official endorsement of the document, *ni* probably being an abbreviation of the term *nibaddham* used in similar cases.

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[1] The "Munholee" of the Indian Atlas, sheet No. 119, 6 miles south of Deokot; Long. 88° 35′ E.; Lat. 25° 19′ N.

The INSCRIPTION divides itself into:—

(*a*) a genealogical portion, in verse, giving the names of 19 princes of the Pāla family of Magadha, 17 of which appear to have been reigning kings (ll. 1–27);

(*b*) the portion containing the grant, in prose (ll. 27–49);

(*c*) the usual benedictive and imprecatory verses; this portion ends with the mention of the name of the person who acted as *dūtaka* and of the engraver; it is in verse throughout (ll. 49–58).

With reference to the GENEALOGY OF THE PĀLA KINGS as recorded in this Inscriptions, I need merely point out that up to Vigrahapāla III. it almost verbally agrees with the corresponding passage in the Amgachi Plate (*Indian Antiquary*, Vol. XXI, p. 100). The only notable difference is that the verses beginning with *yaṁ svāminaṁ rāja-guṇair=anūnam* (ll. 13-14), and with *deçe prāci pracura-payasi* (ll. 19–21) have been left out in this Inscription. I may also note that by the reading of this Inscription it is now possible to correct the passage read doubtfully as *viçva-priye* in l. 15 of the Amgachi Plate and in l. 20 of the Dinajpur Plate of Mahīpāla (*this Journal*, Vol. LXI, 1892, Part I, p. 83); the corresponding passage in the present Inscription (l. 13) distinctly reads *netra-priye*, which appears to be the correct reading. From Vigrahapāla III., onwards, we then have the following succesion of kings:—

(1) MAHĪPĀLA II., son of Vigrahapāla III., (l. 18);
(2) ÇŪRAPĀLA, son of Vigrahapāla III., and younger brother of Mahīpāla II., (l. 20);
(3) RĀMAPĀLA, another son of Vigrahapāla III., and brother of Mahīpāla II., and of Çūrapāla (l. 21);
(4) KUMĀRAPĀLA, son of Rāmapāla (l. 23);
(5) GOPĀLA III., son of Kumārapāla (l. 24);
(6) MADANAPĀLA, son of Rāmapāla and Madanadevī (l. 26).

The portion of the inscription giving the pedigree of these six kings, appears to be corrupt in some passages, and is not entirely intelligible to me. As, however, no real historical facts are mentioned in those verses, I trust that I will be excused in refraining myself from giving a translation. I merely wish to point out here, that the names of the first two kings, Mahīpāla II., and Çūrapāla, have been made known to us for the first time only very recently in a notice on the *Rāmacarita*, a poetical biography of Rāmapāla, discovered by my learned friend, Mahamahopadhyaya Haraprasad Shastri, and published in the *Proceedings of this Society*, March 1900, p. 70 ff. They are omitted in the pedigree of Pāla kings, occurring in the Kamauli Plates of Vaidyadeva of Prāgjyotiṣa (*Epigr. Indica*, Vol. II, p. 350), from which record we have been already acquainted with the names of their two successors, Rāmapāla and Kumārapāla. Of Madanapāla, we possess a short dedicatory inscription, dated in his 19th year, while the name of Gopāla III., his nephew and predecessor on the Pāla throne, is entirely new to us. As to Madanapāla's time, I can only say that I believe him to have lived in the first half of the 12th century A.D.

The grant made by him on the occasion of his queen, the Paṭṭamahādevī Citramatikā, consisted of a village perhaps named Kāṣṭhāgiri, lying in the Koṭivarṣa-viṣaya, and belonging to the Pauṇḍravardhana-bhukti. It was given to a Brahman, Vaṭeçvarasvāmiçarman, son of Çaunakasvāmin, grandson of Prajāpatisvāmin, and great-grandson of Vatsasvāmin, an inhabitant of Campāhiṭṭī, student of the Kautthuma Çākhā of the Sāmaveda, fellow-student of Bhūṣaṇa, and belonging to the Kautsa Gotra and Çāṇḍilya-Asitadevala Pravara (ll. 42–45). The village was given to him as a *dakṣiṇā*, after having read the Mahābhārata for the benefit of the Queen. The passage recording this fact, is of peculiar interest; it reads (l. 45 ff.): *Paṭṭamahādevī-çrī-Citramatikayā Vedavyāsa-prokta-prapāṭhita-Mahābhārata-samutsarjjita-dakṣiṇātvena Bhagavantaṁ Buddha-bhaṭṭārakam=uddiçya çāsanī-kṛtya pradatto ऽsmābhiḥ.* The order confirming the grant was issued from the royal camp at Rāmāvatī, situated on the banks of the Ganges (l. 30). It was given in the king's 8th year, on the 15th lunar day of Caitra (ll. 49 and 57). The minister of peace and war, Bhīmadeva, acted as *dūtaka* (l. 57). The engraver's name was Tathāgatasara (l. 58). With the exception of the Pauṇḍravardhana-bhukti and the Koṭivarṣa-viṣaya, the names of the localities mentioned in this inscription are new to us; I am unable to identify any of them.

I now edit the Inscription from the original plate.

The Seal:

(ÇRĪ-MADANAPĀLAḤ.)

The Plate. Obverse:

(l. 1,) Oṁ namo Vu(Bu)ddhāya ॥ Svasti ॥ Maitrīṁ[1] kāruṇya-
ratna-pramudita-hṛdayaḥ preyasīṁ sandadhānaḥ samyak-

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[1] Metre Sragdharā.

samvo(mbo)dhi-vidyā-sarid-amala-jalaḥ(la)-kṣāli-
(l. 2,) t-ājñāna-paṅkaḥ । jitvā yaḥ kāma-kāri-prabhavam=abhibha-
vaṁ çāçvatāṁ(tīṁ) prāpa çānti(ntiṁ) sa çrīmān
lokanātho jayati Daçava(ba)lo ऽ nyaç=ca GŌPĀLADEVA-
(l. 3,) Ḥ ॥ Lakṣmī[1]-janma-niketanaṁ sama karo voḍhu[ṁ*] kṣamaḥ
kṣmābharaṁ pakṣa-ccheda-bhayād=upasthitavatām=ek-
āçrayo bhūbhṛtāṁ । maryādā-paripālan-aika-ni-
(l. 4,) rataḥ çaury-ālayo ऽ smād=abhūt dugdh-āmbhodhi-vilāsa-
hāsa-vasatiḥ çrī-DHARMMAPĀLO nṛpaḥ ॥ Rāmasy=eva
gṛhīta-satya-tapasas=tasy=ānurūpo guṇaiḥ
(l. 5,) Saumitrer=udapādi tulya-mahimā VĀKPĀLA-nām=ānujaḥ [।*]
yaḥ çrīmān naya-vikram-aika-vasatir=bhrātuḥ sthitaḥ
çāsane çūnyāḥ çatru-patākinībhir=a-
(l. 6,) karod=ek-ātpatro[2] diçaḥ ॥ Tasmād[3]=Upendra-caritair=jaga-
tīṁ punānaḥ putro va(ba)bhūva vijayī JAYAPĀLA-nāmā ।
dharmma-dviṣāṁ çamayitā yudhi DEVAPĀLE yaḥ pū-
(l. 7,) rvva-je bhuvana-rājya-sukhāny=anaiṣīt ॥ Çrīmad[4]-VIGRAHA-
PĀLAS=tat-sūnur=Ajātaçatrur=iva jātaḥ । çatru-vanitā-
prasādhana-vilopi-vimal-āsi-jala-dhāraḥ ॥
(l. 8,) Dik-pālaiḥ[5] kṣiti-pālanāya dadhataṁ dehe vibhaktān guṇān
çrīmantaṁ janayām=va(ba)bhūva tanayaṁ NĀRĀYAṆAṀ
sa tābhūṁ[6] । yaḥ kṣoṇī-patibhiḥ si(çi)romaṇi- rucā=
(l. 9,) çliṣṭ-āṅghri-pīṭh-opalaṁ nyāy-opāttam=alañ-cakāra caritaiḥ
svair=eva dharmm-āsanaṁ ॥ Toy-āçayair[7]=jjaladhi-mūla-
gabhīra-garvbhai(rbbhai)r=dev-ālayaiç=ca kula-bhū-
dhara-
(l. 10,) tulya-kakṣaiḥ[।*]vikhyāta-kīrti(rtti)r=abhavat=tanayaç=ca
tasya çrī-RĀJYAPĀLA iti madhyama-loka-pālaḥ ॥ Tasmā-
[t*][8]=pūrvva-kṣitidhrān=nidhir=iva mahasāṁ RĀṢṬRA-
(l. 11,) KŪṬ-ānvay-e[n*]dos=TUṄGASY=ottuṅga-mauler=duhitari
tanayo BHĀGYADEVYĀṀ prasūtaḥ । çrīmān GŌPĀLADEVAÇ=
ciratar am=avaner=eka-patnyā iv=ai-
(l. 12,) ko bharttā=bhūn=n-aika-ratna-dyuti-khacita-catuḥ-sindhu-
citr-āṅçu(ṁçu)kāyāḥ ॥ Tasmād[9]=va(ba)bhūva savitur=
vvasu-koṭi-vardhī kālena candra iva VIGRAHAPĀLA-
(l. 13,) DEVAḤ । netra-priyeṇa vimalena kalāmayena yen=oditena

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[1] Metre Çārdūlavikrīḍita ; and of the next verse..

[2] Read *ekātapatro*.

[3] Metre Vasantatilakā.

[4] Metre Āryā.

[5] Metre Çārdūlavikrīḍita.

[6] Read *prabhuṁ* with the Amgachi and Dinajpur plates.

[7] Metre Vasantatilakā.

[8] Metre Sragdharā.

[9] Metre Vasantatilakā.

dalito bhuvanasya tāpaḥ ॥ Hata[1]-sakala-vipakṣaḥ saṅgare
vā(bā)hu-darpā(d[2]=a)nadhi-

(l. 14,) kṛta-viluptaṁ rājyam=āsādya pitryaṁ । nihita-caraṇa-padmo
bhūbhṛtāṁ mūrdhni tasmād=abhavad=avanipālaḥ çrī-
MAHĪPĀLADEVAḤ ॥ Ttajan[3] yo-

(l. 15,) ṣ-āsaṅgaṁ çirasi kṛta-pādaḥ ksitibhṛtāṁ vitanvan sarvv-
āçāḥ prasabham=uday-ādrer=iva raviḥ । guṇa-grāmyā[4]
snigdha-prakṛtir=anurāg-ai-

(l. 16,) ka-vasatis=tato dhanyaḥ puṇ[y*]air=ajani NAYAPĀLO nara-
patiḥ ॥ Pītaḥ[5] saj-jana-locanaiḥ Smara-ripoḥ pūjā-nu-
raktaḥ sadā saṁgrāme dha-

(l. 17,) valo=dhika-grahakṛtāṁ[6] kālaḥ kule vidviṣāṁ । cāturvvarṇ-
ya-samāçrayaḥ sita-yaçaḥ-pūrair=jagal=lambhayan tas-
mā-d=VIGRAHAPĀLADEVA-nṛ-

(l. 18,) patiḥ puṇyair=jjanānām=abhūt ॥ Tan-[7]nandanaç=candana-
vāri-hāri-kīrtti-prabh-ānandita-viçva-gītaḥ । çrīmān=
MAHĪPĀLA iti dvitīyo

(l. 19,) dvij-eça-mauliḥ Çiva-vad=va(ba)bhūva ॥ Tasyā[8]=bhūd=
anujo Mahendra-mahimā kandaḥ pratāpa-çriyām=ekaḥ
sāhasa-sārathir=guṇa-na(ma)yaḥ

(l. 20,) çrī-ÇŪRAPĀLO nṛpaḥ[।*]yaḥ svacha(ccha)nda-nisargga-
vibhrama-bharā[n*] vivbhra(bibbhra)t sarvv-āyudha[9]
prāgalbhyena manaḥsu vismaya-bhayaṁ sadyas=tatāna
dviṣāṁ ॥ E-

(l. 21,) tasyā=pi sahodaro narapatir=ddivya-prajā-nirvbha(rbbha)ra-
kṣobh-āhūta-vidhūta-vāsava-dhṛtiḥ çrī-RĀMAPĀLO ऽ bha-
vat । çāsaty=eva

(l. 22,) ciraṁ jaganti janake yaḥ çaiçave visphurat-tejobhiḥ para-
cakra-cetasi camat-kāraṁ cakāra sthiraṁ ॥ Tasmād[10]=
ajāyata nij-ā-

(l. 23,) yata-vā(bā)hu-vīrya-nispī(ṣpī)ta-pīvara-virodhi-yaçaḥ-
payodhiḥ । medasvi-kīrttir=amar-endra-vadhū-kapola-
karppūra-pattra-makarī sa KU-

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[1] Metre Mālinī.

[2] The akṣara *da* has been added later; it looks rather like the *avagraha* sign.

[3] Metre Çikhariṇī. Read *Tyajan doṣāsaṅgam* with the Amgachi plate.

[4] Read *guṇ-āgrāmyaḥ*; the Amgachi plate here reads *hata-dhvāntaḥ*.

[5] Metre Çārdūlavikrīḍita.

[6] Read *caturo=dhikaṁ ca Haritaḥ* with the Amgachi plate.

[7] Metre Upajāti,

[8] Metre Çārdūlavikrīḍita; and of the next verse.

[9] Read *sa-sarvv-āyudhān.*

[10] Metre Vasantatilakā.

(l. 24,) MĀRAPĀLAḤ ‖ Pratta(tya)rtthi[1]-pramadā-kadamva(mba)-
ka-çiraḥ-sindūra-lopa-krama-krīḍā-pāṭala-pāṇir=eṣa sus-
uve GOPĀLAM=ū(u)rvvī-bhujaṁ |

(l. 25,) dhātrī-pālana-jṛmbhamāṇa-mahimā karpūra-pāṁç-ūtkarair=
devaḥ kīrttim=a-yonija[ṁ*]vitanute yaḥ çaiçave krīḍi-
taṁ ‖ Tad[2]=anu MADANA-

(l. 26,) DEVĪ-nandanaç=candra-gauraiç=carita-bhuvana-garvbha-
(rbbha)ḥ prāṁçubhiḥ kīrtti-pūraiḥ | kṣitim=avarama-
tātas=tasya sapt-āvdhi (bdhi)-dāmnīm=abhṛta MADANAPĀ-

(l. 27,) LO Rāmapāl-ātmajanmā | (‖) Sa khalu Bhāgīrathī-patha-
pravarttamāna-nānāvidha-nauvāṭaka-sampādita-setu-
va(ba)ndha-nihita-çaila-

(l. 28,) çikhar[i*]ṇī-vibhramān=niratiçaya-ghanāghana-kari-ghaṭā-
çyāmāyamāna-vāsara-lakṣmī-samāravdha(bdha)-santata-
jalada-samaya-sandehā-

(l. 29,) d=udi(dī)cīn-āneka-narapati-prābhṛtīkṛt-āprameya-haya-
vāhinī-khara-khur-otkhāta-dhūlī-dhūṣa(sa)rita-dig-anta-
rālāt parameçvara-sevā-

(l. 30,) samāgat-āçeṣa-Jamvu(mbu)dvīpa-bhūpāl-ānanta-pāda-
bhara-namad-avaneḥ çrī-RĀMĀVATĪ-nagara-parisara-sa-
māvāsita-çrīmaj-jaya-skandhāvā-

(l. 31,) rāt | Parama-saugato Mahārājādhirājaḥ[3] çrī-RĀMAPĀLADEVA-
pād-ānudhyātaḥ Parameçvaraḥ Paramabhaṭṭārako Mahā-
rājādhirā-

(l. 32,) jaḥ çrīman-MADANAPĀLADEVAḤ kuçalī ‖ çrī-PAUṆḌRA-
VARDDHANA-bhuktau KOṬĪVARṢA-viṣaye HALĀVARTTA-
maṇḍale [Kāṣṭhāgiri-saṁviṁçatyāvādhikopetasa-

(l. 33,) kaivadārvvacaṭṭaraṭṭake][4] tṛ[ṁ*]çatikāyāṁ bhūmau sa-
mupāgat-āçeṣa-rāja-puruṣān rāja-rājā(ja)nyaka-rāja-
putra-rājāmatya-mahāsāndhivi-

(l. 34,) grahika-mahākṣapaṭalika-mahāsāmanta-mahāsepā(nā)pati-
mahāpratīhāra-dauḥsādhasādhanika-mahākumārāmātya-
rājasthānī-

(l. 35,) yoparika-cauroddharaṇika-dāṇḍika-dāṇḍapāsi(çi)ka-çauni-
ka-kṣetrapa-prāntapāla-koṭṭapāla-aṅgarakṣa-tad-āyukta-
viniyuktaka-

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[1] Metre Çārdūlavikrīḍita.

[2] Metre Mālinī.

[3] Read *Mahārājādhirāja-çrī-Rāmapāladeva.*

[4] The reading of this passage remains very doubtful.

Reverse :

(l. 36,) hasty-asv(çv)-oṣṭra-nau-va(ba)la-vyāpṛtaka-kiçora-vaḍavā-go-mahiṣ-āj-āvik-ādhyakṣa-dūta-preṣaṇika-gamāgamika-ati(bhi)tvaramāṇa-vi-

(l. 37,) ṣayapati-grāmapati-tarika-çaulkika-gaulmika-Gauḍa-Mālava-Coḍa-Khasa-Hūṇa-kulika-Karṇṇāṭa-Lāṭa-cāṭa-bhaṭa-sevak-ādī-

(l. 38,) n anyāṁç=c=ākīrttitān rāja-pād-opajīvina[ḥ*]prativāsino vrā(brā)hmaṇ-ottarān mahattam-ottama-kuṭumvīṁ(mbi)-purogama-caṇḍāla-paryantān ya-

(l. 39,) thārha[ṁ*] mānayati vo(bo)dhayati samādisa(ça)ti ca viditam=astu bhavatāṁ ‖ yath=opari-likṣi(khi)to=yaṁ grāmaḥ ‖ sva-sīmā-tṛṇa-pluti-gocara-paryantaḥ ‖

(l. 40,) sa-talaḥ s-oddeçaḥ s-āmra-madhūkaḥ sa-jala-sthalaḥ sa-gartt-oça(ṣa)raḥ sa-jhāṭa-viṭapaḥ sa-dara-çāpasāraḥ[1] sa-canroddharaṇikaḥ parihṛta-sarvva-

(l. 41,) pīḍaḥ a-cāṭa-bhaṭṭa(ṭa)-prāveçaḥ a-kiñcita-paragrāhyaḥ[2] [samasta*]-bhāga-bhoga-hiraṇy-ādi-pratyāya-sametaḥ ratna-traya-rāja-sambhoga-varjjitaḥ

(l. 42,) bhūmi-cchidra-nyāyena ā-candr-ārka-kṣiti-sama-kālaṁ mātāpitror=ātmanaç=ca puṇya-yaço-bhivṛddhaye [Kautsa]-sagotrāya Çāṇḍi-

(l. 43,) ly-Āçi(si)ta-Devala-pravarāya paṇḍita-çrī-Bhūṣaṇa-savra(bra)hmacāriṇe Sāmaved-āntarggata-Kautthuma-çākh-ādhyāyine Campāhiṭṭiyāya

(l. 44,) CAMPĀHIṬṬĪ-vāstavyāya VATSAÇVĀ(SVĀ)MI-prapautrāya PRAJĀPATIÇVĀ(SVĀ)MI-pautrāya ÇAUNAKAÇVĀ(SVĀ)MI-putrāya paṇḍita-bhaṭṭaputra-çrī-VAṬEÇVARAÇVĀ(SVĀ)-

(l. 45,) MIÇARMMAṆE Paṭṭamahādevī-çrī-CITRAMATIKAYĀ Vedavyāsa-prokta-prapāṭhita-Mahābhārata-samutsarjjita-dakṣiṇātvena Bhagava-

(l. 46,) ntaṁ Buddha-bhaṭṭārakam=uddiçya çāsanī-kṛtya pradatto s smābhiḥ । ato bhavadbhiḥ sarvvair=ev-ānumantavyaṁ bhāvibhir=api pa(bhū)mipati-

(l. 47,) bhir=bhūmer=ddāna-phala-gauravāt apaharaṇe mahānanaraka[3]-pāta-bhayāc=ca dānam=idam=anumody-ānumodya pālanīyaṁ prativāsi-

(l. 48,) bhiç=ca kṣetra-karair=ājñā-çravaṇa-vidheyi-bhūyaḥ(ya) yathā-kālaṁ samucita-bhāga-bhoga-kara-hiraṇy-ādi-pratyāy-opanayaḥ kārya iti ‖

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[1] Read *sa-daç-āparādhaḥ.* [2] Read *a-kiñcit-pragrāhyaḥ.* [3] Read *mahānaraka-.*

(l. 49,) Samvat 8 candra-gatyā caitrakarmma-dine 15 [॥*]Bhavanti c=ātra dharmm-ānusa(ça)ṁsinaḥ çlokāḥ ॥ Va(Ba)hubhir[1]=vvasudhā dattā rājabhiḥ

(l. 50,) Sagar-ādibhiḥ [।*] yasya yasya yadā bhūmis=tasya tasya tadā phalaṁ ॥ Bhūmiṁ yaḥ pratigṛhṇāti yaç=ca bhūmiṁ prayacchati । ubhau tau puṇya-

(l. 51,) karmmāṇau niyataṁ svargga-gāminau ॥ Gām=ekāṁ svarṇṇam=ekañ=ca । bhūmer=apy=arddham=aṅgulaṁ [।*] haraṁ narakam[2]=āyāti । yāvad=ābūti(ta)-

(l. 52,) saṁplavaṁ ॥ Ṣaṣṭiṁ(ṣṭiṁ)varṣa-sahasrāṇi svargge tiṣṭhati bhūmidaḥ [।*] ākṣeptā c=ānumantā ca tāny=eva narake vaset ॥ Sva-dattāṁ pa-

(l. 53,) ra-dattā vāṁ(dattāṁ vā) yo hareta vasundharāṁ[।*]sa viṣṭhāyāṁ kṛmir=bhūtvā pitṛbhiḥ saha pacyate ॥ Āsphoṭayanti pitaro valgayanti pitāma-

(l. 54,) hāḥ । bhūmido ऽsmada(t)-kule jātaḥ sa nas=trātā bhavisya(ṣya)ti ॥ Sarvvān[3]=etān bhāvinaḥ pārthivendrān bhūyo bhūya[ḥ*] prārthayaty=e-

(l. 55,) sa (ṣa) Rāmaḥ [।*] sāmānyo=yaṁ dharmma-setur=narāṇāṁ kāle kāle pālaniyaḥ krameṇa ॥ Iti[4] kamala-dal-āmvu(mbu)-vindu-lolāṁ Çriyam=a-

(l. 56,) nucintya manusya(ṣya)-jīvitaṁ ca[।*]sakalam=idam=udāhṛtañ=ca vu(bu)ddhvā na hi puruṣaiḥ para-kīrttayo vilopyāḥ ॥ Kṛtaḥ[5] sakala-

(l. 57,) nītijño dhairya-sthairya-mahodadhiḥ[।*]Sāndhivigrahikaḥ çrīmān BHĪMADEVO ऽtra dūtakaḥ ॥ Rājye Madanapālasya aṣṭame

(l. 58,) parivaccha(tsa)re । tāmrapaṭṭam=imaṁ çilpī TATHĀGATASARO ऽ khanat ॥

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[1] Metre Anuṣṭubh ; and of the next five verses.

[2] Read *haran=narakam.*

[3] Metre Çālinī.

[4] Metre Puṣpitāgrā.

[5] Metre Anuṣṭubh ; and of the next verse.

On the identification of Kusinara, Vaisali and other places mentioned by the Chinese pilgrims.—By W. Hoey, Esq., Litt.D., I.C.S.

(*With an edition of a new copper-plate Inscription of Jayādityadeva* II.—*By* Dr. T. Bloch.)

[Read, May 1899.]

The hitherto accepted identification of some places noticed by Fa Hian and Hwen Thsang must be subjected to a very careful re-examination because the discovery of the Lumbini Garden has shown that Kapilavastu lies in a direction quite different from that indicated by General Cunningham and his assistants of the Archaeological Department, and I think it is incumbent on any one who has doubts and can propose points for discussion which may assist in determining the geographical position of ancient places of interest, to lay his views before this Society. It is purely because I am anxious to reach the truth that I venture upon this communication. My main object at present is to show that Cheraud and not Besarh is Vaisali and that Kusinara is Sewan itself or near it, but it is as well to use this opportunity to furnish notes regarding other places.

There is no doubt that the city referred to by Fa Hian as Ki-jou-i and by Hwen Thsang as Kie-jo-kio-she-kwo is Kanauj,[1] and I shall take this as my starting point. Proceeding from this the later pilgrim visited, or seems to have visited, Na-po-ti-po-ku-lo, which has been correctly identified with Newal, an ancient site a little north of Bangarmau in the Unao District. I visited this place in 1876-77 and obtained Kuṣaṇa coins and independently arrived at this identification. Fa Hian on leaving Kanauj went in the same direction which Hwen Thsang subsequently took and he reached a forest which he called

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[1] In view of the frequent appearance of the name 'Lorik' in connection with Buddhist places and the possible connection of a part of that hero's legendary history with Buddha, I here note that it is remarkable to find his father's name given as Buṛhkubbha, 'the old hunchback.' Has this any connection with 'Kanyākubja'? The Ahirs who sing of Lorik are—Kanaujiā Gwālās. Lorik is clearly the younger (lahura) brother of Sauru, 'the dark one' (Sānvala).

A-li (*var.* Ho-lo, A-lo) and here he found traces of Buddha in the usual form of memorial buildings. He and Hwen Thsang probably visited the same place. Anyhow I have no doubt that Asi-vana is the forest of A-li, and the present pargana of Asiwan probably represents approximately the area of the forest of Fa Hian's time. The people have a local tradition that the town of Asiwan was founded by one Asan, a name which will be seen to be of importance when I recur later on to the route subsequently taken by Hwen Thsang.

On leaving the A-li Forest Fa Hian proceeded to the country of the Sha-chi. He travelled direct, but Hwen Thsang on leaving Newal went to other places before he reached Pi-so-kia, which is, I think, plainly the capital of the Sha-chi. One is tempted to say that the Sha-chi must be the Sāketas (Sansc.), the inhabitants of Sāketa or Ayodhyā, and to restore Pi-so-kia as Vi-sāka (not Viçākha) so as to introduce a common root to connect Sa-chi and Pi-so-kia as Chinese renderings of Sanscrit names. The temptation is all the stronger because at the S.E. of Ramkot, the ancient citadel of Ayodhyā, we have the mani parbat [1] (Orajhār), which might be thought to be a stūpa, and beside it there are numerous 'chilbil' (Sansc. *civillika*) trees. The twigs of the chilbil are largely used to serve the purpose of tooth brushes. All this bears a plausible resemblance to what both pilgrims record as to the place which they visited but doubt still remains. I have been unable to find any trace of Deva-çarman at Ayodhyā, but I do find that the hermitage of this sage is still pointed out near the Varaha sangam, the junction of the Sarju and Gogra rivers near Pasha, in the Gonda District, where there is still a shrine to which Hindu pilgrims resort. They attach sanctity to this locality because of the image of the Boar here placed which is said to mark the scene of the Varāha Avatāra. I believe that Pasha will be found to be Pi-so-kia, the capital of the kingdom or country of the Sha-chi.

Proceeding from this both pilgrims went on to Çrāvasti, which may be held to be Set-mahet until something tangible be shown to upset the identification. It is true that Kapilavastu is said to have lain S.E. from Çrāvasti or rather the pilgrims went S.E. from that city to visit places on their way to Kapilavastu, whereas the direction of the *supposed* site of Kaṇakamuni's stupa is slightly N. of E. from Set-mahet, but we find so many instances in which directions given by the pilgrims do not tally with directions shown on modern maps, prepared on the basis of careful surveys with modern instruments that we must not argue too strenuously on the directions loosely recorded and often palpably misstated by the Chinese pilgrims, who travelled over a country where impenetrable forest and dense jungle rendered an accurate estimate of direction impossible, and where even the distances stated cannot accurately correspond to those taken out by straight lines run across the maps of to-day. Routes were devious 1,250 years ago. A chinese pilgrim may have left a city A by the S.E. gate and travelled for a time S.E. and then have turned in the tortuous mazes of a jungle northward and traversed what he called 12 yojanas before reaching another city B. He would have recorded: 'Proceeding from this place A to the S.E., after travelling 12 yojanas, we reach B.' To-day it may be that there is a direct road and we should say, 'Leaving A and going E. along a metalled road for 60 miles we reach B.' I note this here simply to show that we have need to be very cautious in treating the directions and distances stated by the Chinese pilgrims as fixed data in themselves sufficient to enable us to determine locations. The descriptions of places and the names and objects which are said to have existed in their days are much safer data for identification.

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[1] This spot, however, may really preserve the name of Maṇi-cūḍa, one of the prehistoric kings of Ayodhyā.

From Çrāvasti the pilgrims proceeded to Kapilavastu. Of this centre of intense interest I need now say nothing. Government has undertaken inquiries and I trust that the present examination of sites north of Basti will lead to satisfactory identifications. Meanwhile I have only to say that I recently obtained a copper-plate inscription which will enable the Society to test the accuracy or probable correctness of the results reported. An edition of this plate will be found in an Appendix to this paper. It will suffice here to note the recorded facts. The document is a deed of gift by King Jayāditya of certain land to a Kāyastha named Keçava. The area of the grant seems to have been considerable. It consisted of the town land Kumāraṣaṇḍikā including the hamlets of Patraṣaṇḍā, Çaŋkuṣaṇḍā, Gāddhī, and Deulī, situated in the Leḍḍikā subdivision of the Daddaraṇḍikā district. The boundaries are given: on the east the Rohiṇīnadī; on the south the tilaka tree (? forest); on the north the kumbhī tree (? forest) and on the west the Hastilaṇḍākhya khāta *i.e.*, the Ditch or moat known as that where the elephant was thrown. The date of this inscription is Samvat 921, or 864-5 A.D. Thus we have the name of the moat where Buddha cast away the elephant still preserved about two centuries and a quarter after Hwen Thsang's visit. The great captain, as he is described in the text, who brought the orders for the gift was Grahakuṇḍa, a name perhaps of importance with reference to the Grah Kuṇḍ near Tirbeni. There is no other proper name which at present strikes me as relevant.

We do not hear of a ditch where an elephant was thrown anywhere save in connection with Kapilavastu, but unfortunately I cannot yet trace the villages or territorial divisions named in the plate, but inasmuch as they contained mines of salt and iron the tract referred to must be near the hills. Is it not possible that Saina Maina (Çāyana Māyana: the dream couch), 5 miles S.W. of Butwal may be Kapilavastu? I think it may be near it at any rate, unless there were more than one sculptured or painted representations of the dream of Māyā which gave to places their names.

I omit for the present the places between the Lumbini Garden and Vaisali but shall return again to discuss them also.

I have long entertained grave doubts as to the identity of Besarh and Vaisali. When Buddha left his home he visited Vaisali and he also consulted the teachers mentioned as Arāḍa Kalāma and Uruvilva Kāçyapa before he reached Gaya. The Kāçyapa here alluded to seems to have resided at the place known as Urwal on the East bank of the Son river, and as Uruvilva Kāçyapa is Kāçyapa of Uruvilva we may conceive Arāḍa Kalāma to be Kalāma of Arāḍa and Arāḍa to be the modern Arrah. In that case, any one will see that Buddha would have been guilty of making a foolish out-of-the-way detour if he went across the Great Gandak to Besarh before going to Arrah, Urwal and Gaya. If, when he fled from his home, he went down country *viâ* Kasia and the Saran district, crossed the Ganges and proceeded to Arrah, then crossed the Son and took Urwal on his way to Gaya, we have a probable route and there is no ground for supposing that he did not take as direct a course as reasonable. These considerations led me to believe that Vaisali must be found in the Saran district, west of the Great Gandak and north of the Ganges.

When Rāma was proceeding from Ayodhyā to Mithilā with Viçvāmitra, he passed through certain places until they reached the banks of the Son, but this river they did not cross. They crossed the Ganges and when they had landed on the other side they beheld the city named Viçāla, where they were entertained by the king Sumati. Viçvāmitra narrated the legendary history of the kingdom over which this king reigned. I need not quote it here, but I refer the curious to the XLV and following sections of the Bālakāṇḍa of Vālmīki's Rāmāyaṇa. There is much that is suggestive in connection with the stories told by Hwen Thsang and I think that the reference by Vālmīki to Çakra justifies the suggestion that Saran may possibly be Çakra + araṇya the forest of Çakra or Indra.

We know that when Buddha left Magadha for the last time he went towards Vaisali. The gate by which he left Pataliputra was afterwards called the Gotama gate and the place where he crossed the Ganges was called thereafter the Gotama Ferry. The Gotama Ghat is still known east of Revilganj. We also have the story of Ānanda's leaving Pataliputra for Vaisali and we read that when he reached the Ganges he discovered that the people of Vaisali had come out to meet him in the hope of obtaining his body as they knew he was about to die and they wished to do it honour: but he was pursued by Ajātaçatru's army which had been sent with the same object. He therefore surrendered himself to death (entered samādhi) on an island in the river and his body parted in two so that the rival claimants obtained equal parts. This story is preserved for us in the name Cherand, which is simply Chidra + aṇga : the divided body.

It is very remarkable that there is a local tradition at Cherand based on this story. It is this. There was a king at Cherand named Moraddhuj (Mayūradhvaja) in the Dwāpara Yuga who professed great devotion to the gods. Krishna determined to put the king's faith to a test and came one day to his palace disguised as a mendicant and asked for the right half of the king's body for some sacrificial purpose. He explained to the king that his wife and son must each hold one end of a saw (ārā) and saw him in two, but if he shed tears the gift would not be acceptable. The king agreed and the operation commenced but presently he began to shed tears from his left eye. The mendicant reminded the king that the professed gift was liable to rejection but the latter explained that the left eye wept because the right half of the body was alone being taken and the other left. Krishna was so pleased with this devotion that he exercised his divine power, stopped the operation, restored the body to its former state and flung the saw away. It fell at Arrah in the Shahabad district, giving its name to that place. This story is certainly the same in origin as that told of Ānanda. It is a Hindu version of facts underlying the Buddhist story.

The conclusion to which I come is that Vaisali did not lie on the east but on the west of the present Great Gandak. I shall presently fix it beyond doubt east of Chupra probably at Cherand itself. The whole of the northern bank of the Ganges from Hajipur right up to Manjhi (Mangchi in the Āin-i-Akbarī) would repay careful and minute examination.

I may here digress for a moment to make some notes as to Saran Khass which I at first erroneously surmised to be Vaisali and visited for that reason. Saran Khass lies about 16 miles due north of Manjhi, and contains extensive ancient remains covered for the most part by cultivated fields. There is an abrupt rise at Makhdum Shah's Dargah, a little south of Harpur, which continues for a couple of miles south until it terminates somewhat more abruptly beyond Khwajah Pir's

Mazar. On the east of this elevated site runs a stream known locally by two names, Gandaki and Sarayu. This is well defined and may have been a channel made in ancient days for water supply. West of this and parallel to it the high ground extends for an average width of not less than half a mile. As I passed from the northern end I observed undulations with occasional very prominent heights and noticed that cultivators have taken out numerous bricks while ploughing. On approaching the southern end I observed a pile near a mound on which are the remains of a brick building. I learned that this pile is the Ganj-i-S̲h̲ahīdān or Martyr's Heap near the traditional Raja's kot. This indicates a desperate assault at some time on a Hindu stronghold. Further on I came to Khwajah Pir's Mazar and found two tombs in an open enclosure. In one corner there was a large black stone about 4½ ft. long on which I observed Hindu sculptures of the *Navagraha* or nine planets. On the back of the slab there was a long inscription in Tughra character of which I had not then the means of taking a rubbing. It is much worn and could not be read at sight. It is probably historically important.

A few miles west by north of Saran khass is a village called Bhikaband on the map. I visited this spot also and find that there is here a large banian tree which is said to cover about ten acres. In the ground near there are brick remains and an old well lately re-opened. Somewhat S. E. of this is an old temple and the attendant Brahmans wrote the name for me: *Bhīkaban*, which is clearly the 'Bhikshu's Grove.' About a mile west of this are two villages bearing the name Kapia, which suggests the story of the service rendered to Buddha by the monkey (*kapi*) as mentioned by the later Chinese traveller.

I shall now proceed to resume my discussion as regards Vaisali itself. There are some suggestions based on a study of the Mahāpariṇibbāṇa Sutta which I must note. When Buddha had crossed the Ganges for the last time on his way to Vaisali he first visited Koṭigāma and then Nāḍika, after which he arrived at the great city. There he was entertained by the courtesan, Ambapali, at her mango grove outside the city. From Vaisali Buddha went on to Veluva where he was seized with the illness which eventually terminated his life. This is probably the modern Belwa, N.E. of Cherand. Near it we meet with such remarkable names as Sārnāth Chak and Dharma Chak. Buddha then seems to have turned again towards Vaisali for he went to the Cāpāla Caitya, which the text would lead us to believe to have been near the city, if not in it. This name is probably either from *Capalā* or *cāpalā* (Sansc.), a loose woman, and thus alludes to the concubine spoken of by the pilgrims; or from *cāpa* + *ālaya* (Sansc.), the 'bow-place,' where the bow was deposited. Anyhow there can be no mistake as to the mound lying to the east of the town of Chupra, called Telpa. This is undoubtedly the sanscrit *talpa* 'a tower,' and is that built for the mother of the thousand sons and the site of Vaisali is therefore fixed. It is the modern Cherand and was spread along the bank of the Ganges east and west of the present town.

The five rivers to the junction of which the Chinese Pilgrim Fa Hian proceeded was the mouth of the Son. The five rivers are the Jumna, Ganges, Rapti, Sarayu or Gogra, and the Son. Fa Hian crossed at Paleza-Digha Ghat, and had only to go one yojana to reach Pataliputra (Patna). The distance from Cherand to Paleza Ghat is 18½ miles. This was four yojanas and gives a trifle over 4½ miles to the yojana. According to Hwen Thsang the yojana consisted of 4000 bow lengths, each 6 cubits. This means 8000 yards which give us 4·54 miles to the yojana.

We learn from Rockhill's Life of the Buddha based on Tibetan authorities that Buddha on finally leaving Vaisali visited a place called Amra, which may be Amnaur (Amranagara), Jambugāma, Bhaṇḍagāma, Hastigāma, which may be the present Hathwa, and Bhoganagara. After this he reached Pāva.

I now come to speak of a place of which I have some personal knowledge. There is a village known as Papaur or Pappaur (Pāva + pura or Pāpa + pura) about three miles east of Sewan. I visited it some years ago. Near the present homestead there are the remains of a more ancient habitation from which I obtained some copper Indo-Bactrian coins. It represents a place of great antiquity and must be the Pāva where the goldsmith Cunda lived. When Buddha came thus far he went with his followers to the goldsmith's grove and while there he accepted an invitation to dine with the goldsmith to whose house he went. There he was served with the *sūkara*[1] which aggravated the symptoms developed at Veluva and gave his illness a fatal turn. This led him to resolve to push on to Kusinara and he set out with Ānanda in that direction. He was then at least 80 years old and suffering from dysentery. He could not have travelled far and we observe that the Mahāpariṇibbāṇa Sutta represents him as halting under a tree at least once and reaching a river with difficulty. The salient points in connection with his last brief journey are that he left Pāva, halted under a tree, moved on again to a stream called Kakuttha and having crossed a river bearing a name suggestive of gold, he reached the people's park near Kusinara and lay down under some sal trees. Possibly he had not come to Kusinara because he sent Ananda to bring the Mallas to him. After his death there was an imposing ceremony to do honour to his remains. He was laid out on a golden bier and is said to have been kept for seven days: and it is said that he showed his feet from out his winding sheet and he even raised himself and spoke. There was difficulty in moving his remains until Kāçyapa came. Thus the spot where his bier rested was one that must have borne a name associated with it. That name is Sewan, the Sanscrit *çavayāna*: a litter or bier. There is something in names. It is remarkable that we have a particular tree of great age at a mound near Sewan Railway Station. This is known as Jagattra, the Protector or Deliverer of the world. One would expect Hindus to venerate this spot but they do not. They consider it ill-omened. The late Raja of Hathwa desired to enclose all this spot, but the Pandits told him that the act would bring him bad luck. He enclosed a large patch but left the tree outside the walls. He died soon after. This Jagattra is looked upon as the oldest place about Sewan, and its name and associations are significant. There is also a very high mound not far off which has not been explored. I can have no doubt that Kusinara lies somewhere close to Sewan if it be not Sewan itself.

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[1] This is not boar's flesh, but *Sūkara-kanda* 'hog's root,' a bulbous root found chiefly in mounds and jungles, which I have seen Hindus eat with avidity. It is a *phalahar*, permissible to eat on fast days.

The indefatigable Major Waddell has in the third number of the Journal of this Society for 1896, published an abstract of a Tibetan Guide Book to Buddhist sites in India. It is unfortunately a brief and vague *vade mecum* for the traveller and is absolutely unreliable in some of the directions which it gives, but it tells us that the Bāla grove where Buddha died is in the N.W. of the Kamalla or Bāliya des, 'the powerful country.' I find that the tract of country eastward from the Daha river near Sewan and stretching north of the Manjhi and Cherand tappas or parganas is called Ball. Sewan is in the N.W. of the Ball country. This is probably the country of the 'powerful' people (*bala*) and is possibly the same as *malla* (powerful, athletic). When Buddha left Vaisali and visited various places before reaching Pāva the places are said to have been villages of the Licchavis and the Mallas.

Hwen Thsang tells us two Jātaka stories in connection with the country of Kusinara. The one is that of the pheasant which tried to extinguish a forest fire by dipping in water, flying aloft, and shaking its wings that the water might fall on the fire: but the bird's efforts were unavailing and at last Çakra (Indra) put out the fire. This is not a misplaced story in Sewan, the Çakra-araṇya. The second story is that of the deer which, when the forest was burning, helped animals across the river and last of all saved a helpless hare, and itself perished. Now, both stories mention a conflagration and a river. There is one word in Sanscrit which expresses both conflagration and cremation. It is '*daha*.' The river so named is the river of 'conflagration' and also the Çava-daha, the cremation river of the Malla or Balla people.

The Daha takes its rise N.E. of Gopalganj and in its course forms the sheet of water known as Sasa Mansa (*Çaça-mokṣita* 'the rescued hare') and then flows southward to Andur. Near this (at Faridpur) it is joined by the Sondi River and thence its course is S.E. until it falls into the Gogra east of Manjhi. The Sondi is said to be an offshoot of another stream called Narayani but I cannot find this on the maps. It comes down past Manjha Mutkar and Manjha Mallaon. I have said that we must find the word for gold entering into the composition of a river near Kusinara. It is given in the Chinese as Hi-lian and Shi-lai-na-fa-ti. The latter is obviously Suvarṇavatī, which, anyone accustomed to note mutations from Sanscrit to Hindi will see, becomes Soṇa-vatī, or Soṇa-nadī, or Sondi or Sundi.

I have not been able to visit any places near Sewan except Pappaur, but a gentleman who has taken considerable trouble to help me in my researches tells me that there is a very extensive ancient mound covered with trees, locally called a fort of the Cheroos, between Luhsi and Kulinjura about 3 miles N. W. of Sewan. There are also remains of great age on the west bank of the Daha in Ģosopali opposite Salannapur. This name suggests *Sāla-vana-pura*, the city of the Sāla forest. The mention of the Sāla here in any form is interesting. These places should be examined.

There are also considerable remains and a large basalt image further down the Daha at Hasanpur which should be looked to. From this place I received an inscription on a brass plate not yet deciphered.

South-east of Kusinara and west of Vaisali lay the place where Buddha parted from the Licchavis. This is probably Manjhi, the Māngchi of the Āīn-i-Akbarī. It is the 'Māng' or 'Mānjha', the middle line, the parting, and lies on the west of the Daha or Sundi where it joins the Ganges. The Sundi or Daha river was probably the western boundary of the Vaisali kingdom, a narrow tract lying along the bank of the Ganges.

I now return to the Lumbini Garden and ask what were the points visited by the Chinese pilgrims between that place and Kusinara. It is not yet settled what the Rāmagāma Kingdom was or where the town called after Rāma lay. I may mention that the very old town of Kanapar near Dham is also called Ramnagar, but that is not necessarily significant. I can, however, with knowledge point to a very ancient mound called Ghagharra between Pipraich and Captainganj, which should be examined as a possible Stūpa *cum* Vihāra site. After the Rāmagāma stūpa, the pilgrims visited the place where Buddha performed the three great acts of renunciation, where (1) he sent back his horse, (2) he took off his crest-jewel and cut his hair, and (3) he put on the *kaṣāya* robe of the ascetic. We know from the Lalita Vistara and the Romantic Legend that the memorial stūpas erected to mark the place where these three acts were performed were close together. We also know that on his flight from home the Prince came to the country of the Mainas. Kasia lies on the Mainpur tappa, and I believe that the Prince crossed the Chota Gandak in the morning after he left home, and that a black stone image still lying under a tree opposite Hetimpur is a remnant of some memorial there placed to mark the spot where he crossed. The Prince then entered the country of the Mainas, as I have shown above, and the remains at Māta Kuuwar, at Ramabhar, and inside the cane-brake in Kasia town, are what we have left of the memorial buildings placed to commemorate the Great Renunciation. Kasia is the place where the Prince received the *kaṣāya* garment or robe of the mendicant.

The Charcoal stūpa has yet to be found but I am in hopes that it will be identifiable in the mound of Agarwa, N. E. of Taria Sujan which I have not yet seen. The name itself being obviously derivable from *aṅgārika*, charcoal or embers, is promising.

Having located Vaisali at Cherand, I may ask: 'What then is Besarh?' Fortunately that is easily explained. When Hwen Thsang speaks of the country Fo-li-shi, north east of Vaisali, he means Pa-lā-sa or Parāsa,[1] the country of the dāk tree, a name which was given to at least the trans-Ganges part of Magadha. He tells us an exaggerated story about a monster fish in this country and a stūpa commemorating the conversion of 500 fishermen by Buddha. Besarh is the Sanskrit word *vasāḍhya*, the Gangetic porpoise, and the remains at Besarh are those of the town or city of the Monster Fish.

The mere fact that an Asoka pillar may be found somewhere near Besarh does not make it Vaisali: nor are we entitled to say that Cherand is not Vaisali, because an Asoka pillar has not yet come to sight there. It would be interesting to know why Asoka placed his pillars in many places which he selected. I would suggest that he selected Kesaria and Araraj as pillar sites because they probably represent the places where Buddha was believed to have been in former lives respectively a *Kesarī* or lion and the *Arindama Rājā*.

Let me now return to Kanauj and take up Hwen Thsang's route. I assume that he visited Newal and we have to look for 'O-yu-t'o and

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[1] The country of the πρασιοι mentioned by Megasthenes.

'O-ye-mu-khi. The first thing to observe is that the Life of Hwen Thsang shows that he travelled by boat on the Ganges. He must have used a boat to cross from Kanauj on his way to Newal. He was certainly on a boat when attacked by the river-dacoits while on his way from 'O-yu-t'o to 'O-ye-mu-khi. No place that he mentions between Newal and Prayāga can have been very far from the Ganges. The Life differs from the Travels in important details. If we read the latter alone it would seem that Hwen Thsang speaks as if he was reckoning from Newal to 'O-yu-t'o, while the Life represents as a starting point the Bhadra Vihāra where the pilgrims had stayed for three months at Kanauj. These apparently trivial variations are important, because they affect the position of 'O-yu-t'o with reference to the Ganges. Anyhow the distances are 600 li to 'O-yu-t'o, 300 li to 'O-ye-mu-khi and thence 700 to Allahabad. The direction of the intermediate length is described as East. The general direction of the Ganges between Kanauj and Allahabad is S. E. There is a stretch of the river roughly W. to E. between Baksar Ghat and Dalman. The last named place is the spot where Dālabhya Ṛṣi spent his life and west of it a few miles is Chilanla, a name which recalls the Shi-lo-ta-lo of the pilgrim. This is the traditional abode of the Ṛṣi Cyavana, restored to youth by the Açvins. A little farther west is Gagason, venerated by Hindus as the *āçrama* of Garga, a muni who left a host of descendants; and close to this again is Sinhaur, another place of great antiquity. Taking the Singhar Tāra crossing near Sinhaur crossing and crossing south of the river we reach Tāra Bhitaura or Bhati-ura, supposed to be a dwelling place of descendants of Bhṛgu, and proceeding a few miles east we reach Asni, opposite Gagason. At Asni is the shrine[1] of the Açvins, the twin sons of Sūrya (the sun) who are represented by two brass images with their hair coiled over their heads. The myth runs that these deities were born from the nostrils of a mare. May not 'O-ye-mu-khi be *Açvā-mukha*, 'the mare's Head,' and this cluster of sacred places be the kingdom referred to by the pilgrim. The story of the Rishi at Chilanla restored to youth by the Açvins may be another form of the narrative of the conversion of Buddha Siṁha and of the three pious Buddhists who made the bargain about reappearing after death. Anyhow these places are connected and mark what may have been regarded by Hwen Thsang as a kingdom with its capital on the northern bank of the Ganges, that on which the majority of the shrines lies.

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[1] A modern shrine built by the late Maharajah of Benares, but the place was known as Asni long before. It may be that Asanga and his brother were remembered here as "The pair of brothers."

I have when writing about Asiwan referred to the significance of the name Asan as the founder of that place. Might not this name be the Āsanga of the Chinese Traveller? We meet with a similar eponym in connection with Asoha, the chief town of Asoha pargana in Unao district, where the people call the founder Asa Rikh. There are some remains at this place where Bactrian Coins have been found: and these remains may be Buddhist, but it would be rash to say as yet that Asoha is 'O-yu-t'o.

I need not say anything as regards Prayāga which can be no other spot than Allahabad. From this undoubtedly fixed point Hwen Thsang went to Kosambī which has been identified with Kosam *cum* Pabhosa on the northern bank of the Jumna. My learned friend Mr. Vincent Smith, has lately written disputing the correctness of this identification and I must admit that my faith was at first shaken by his arguments. I have a great respect for his acumen but I venture to say that, after considering all that he has written, I cannot but hold to the original identification. Mr. Smith has not himself visited Kosam.

As Hwen Thsang travelled by boat on the Ganges it is highly probable he moved by boat along the Jumna. In that case his first direction would have been S.W. and on his left at any rate we would have had forest as one can see who has traversed the Barah Tahsil of Allahabad District and the adjoining parts of Bandah District. The journey by river would be long and tedious enough to account for the great distance recorded, 500 li. When the traveller left Kōsambī and went north he passed through a dense forest. This may possibly be the present Atharban pargana. As we have the Antar-ved for the Ganges-Jumna Doab, the name may really be correctly *Antar-vana*. This point is worth examination. At any rate *vana* (forest) is beyond doubt.

In Rockhill's "Life of the Buddha" (page 74), where the account of the conversion of the king of Kosambī[1] is given, we are told that at that time the king of Vatsala had assembled his army with the intention of conquering the city of Kanakavatī. West of Kosam about 16 miles on the southern bank of the Jumna where it is joined by that Paisuni river, there are extensive ruins known as Kankotah or Kanak Kot. I have seen them. I excavated a part some years ago and found inscribed stone lintels. This is, I believe, the Kanakavatī referred to, and the position of the two capitals recalls the similar location of Pataliputra and Vaisali.

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[1] I see no reason to suppose that the Vatsa country is not the Kingdom of Kosambī.

There has not been much reliable result obtained yet by attempts to identify the places between Benares and Pataliputra. We have to find the kingdom of Chen-Chu, 'lord of battles.' General Cunningham's endeavour to make Ghazipur the equivalent of Chen-Chu is strained and unfortunately, I fear, does not rest on any solid fact. The form locally given of the ancient name is not, I understand, Garjapur but Gadhipur. The General might as well have said that 'G̲hāzī' is equivalent to 'lord of battles.' The name of the kingdom or, may it not be, of its ruler, is *translated* into Chinese as Chen-Chu. Its capital was on the banks of the Ganges. This is, unfortunately, not a certain key to the place in modern times. A careful examination of local traditions in connection with existing ruins and names may lead to identifications.

I may illustrate the value of tradition by quoting a very curious history handed down of a kingdom which may be that referred to by the Traveller. There was a king somewhere who had a daughter called Kanchavi for whom he could not get a husband. His pandits told him that it was written in her destiny that she should marry a man of low caste. He asked who this might be and they said he was a certain servant in the king's retinue who was a Piçvān. A Piçvān is explained in the story as being a Cheru and the Cherus are said to be represented now by the Dusadhs. The king resolved to send this servant to the end of the earth. He therefore wrote a letter and calling him up told him that Rāmacandra had been born and that he must take this letter, an invitation to Kanchavi's wedding and find Rāmacandra and hand him the letter. He warned him further that, if he returned without delivering the letter, he would be sawn in two. The servant set out and endured great privations and hardships, wandering here and there from place to place, until he met a venerable man in a jungle, who was in reality Rāmacandra and who asked him who he was and where he was going. The king's messenger then told him all about his mission and the letter which he carried. Rāmacandra informed him that he was a *cela* or follower of the person sought and he would accept the letter for him. The messenger delivered the invitation which Rāmacandra read and said: 'Go back, I have accepted the invitation. It is you who will marry the girl.' The Piçvān now turned homeward and as he was passing through the Waina forest he heard a voice calling out: 'Who are you?' but he could see no one. He heard the question repeated again and again and at length replied: "Who are you that I hear calling while I see no one?" The answer came: "I am a tree that bears no fruit and I am sad because other trees have fruit while I yield none. If you know any remedy for this, tell me." The messenger though a Dusadh had been a king in a former birth but because of his misconduct he had been reborn as a Dusadh, and all his wealth and greatness and evil deeds lay buried at the root of this tree, and prevented the tree fulfilling its purpose as a fruit-bearer. Now, by his interview with Rāmacandra, he had obtained illumination and was enabled to see his former life, and he at once knew that it was under this tree that his wealth lay buried: so he told the tree to lean over that he might take out what lay at its root. This the tree did and the man took out his former wealth and recovered his greatness. He became a Raja once more, employed a number of men and built a palace on the spot. He enlisted an army and marched to marry the princess Kanchavi. He encamped in her father's country. The king thinking of his daughter's unmarried state came out and asked him to marry her but, not desiring to seem anxious, he refused, saying that he did not intend to marry for he preferred to spend his days in visiting places of pilgrimage. When the king pressed him he married Kanchavi, who subsequently recognised him by certain marks which he bore. When he returned to his country he built four forts and his descendants were kings for four hundred years. The four forts lie in the Ballia District: the first Waina is in the Wainaban where he had found his wealth under the tree; the second is Kopachit; the third is Sikandarpur;[1] and the fourth was where Husenabad now is in the Banodih Tahsil.

At first sight this seems a very silly tale but the key to its value lies in the word 'Piçvān,' which is from the Sanscrit Piç 'yellow.' There is no caste or race in India called Piçvān but the word refers obviously to a yellow Race. This is the Mongolian or Chinese people. Hwen Thsang tells us of the men from Tu-ko-lo beyond the snowy mountains (obviously yellow people) who came and wandered in India friendless and inhospitably treated, till they met a king who built for them the monastery of the 'unpierced ears.' It was an ornamented building of small dimensions near a lake. The modern Waina in Ballia has ancient remains and it lies to the south of the broad expanse of water known as the Suraha Tal. A few miles S. E. is Ballia itself, the Bhṛgvāçrama, the Kapileçvara and the Dharmāraṇya; and until the last floods washed it away here too on the Ganges bank, I am told, was a temple of the Sun-God, Sūrya-Nārāyaṇa. The general conclusion is that the monastery of the unpierced ears will be found at

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[1] There are extensive ruins at Sikandarpur and close by we meet with Rahilapāli, which reminds us of Rāhula and the old Brahman. This place with reference to Sewan as Kusinara fits in with the place visited by Hwen Thsang on his way to Benares.

Waina[1] or in its neighbourhood, and that it was at Ballia that Hwen Thsang crossed the Ganges to go to Mo-ha-so-lo (Masār).

I regret the length of this communication but I have been anxious for sometime past to contribute what I could to the researches now in progress. I have endeavoured to avoid all appearance of dogmatic assertions and remembered that it is extremely unsafe to argue about places which I have not seen or which others have not fully explored. If I can by suggestions, however crude, assist others in research, I am satisfied.

APPENDIX.

An edition of a new copper-plate inscription of Jayādityadeva II.—

By Dr. T. Bloch.

This Inscription, which is edited here for the first time, has been referred to in the preceding paper on page 76. Regarding its find-place, etc., Dr. Hoey makes the following remarks :—

"I have found it very difficult to trace out the place where this copper-plate, which the son of the Raja of Bansi made over to me, was originally found. It came into the possession of the Bansi family through Durbali Ram Tewari, a Pandit employed to look after a Sanscrit library which the Bansi Rajas have kept up. A very old man named Gauri Charan Lal of Kubabar tells me that a Brahman of Gurmha brought in this copper-plate two years after the mutiny and asked to have it read. So he sent it on through his brother, then employed at Bansi, to the Pandit. The mode of discovery was this. Some men were employed to dig kunkar at the North-East corner of the large sheet of water covering over 30 acres at the village Gurmha. It is a long strip of water extending within Rakhnakhor and Pachgawan. The kunkar was to be supplied for some purpose by two Dakhani Brahmans, who had taken a contract. The labourers, in the course of excavation, found two pots, one containing silver coins, the other gold coins and this Copper-plate. Of course the coins have long since disappeared. I have not been able to visit this place, but I shall now furnish some notes regarding it, and other places of interest, in the same Tappa *Pachgawan*, which lies North of Gorakhpur City. These notes are reliable, because they have been recorded by an English-speaking, well-educated native Magistrate, who is a graduate, and has, in his enquiries, acted under my instructions and provided me with photographs.

Gurhma is not a large village, but the lake is remarkable for a very massive high mound of bricks at the East side, on top of which rises a huge pipal tree Some sculptured remains have been found here, and taken to the monastic cell of a goshain who lives North of the lake. *Pachgawan*, which is south-west of the lake, is a very old place, from which people have recovered grindstones of antique pattern. I think there must be something of importance in the word Gurmha, because the name Gurmhi occurs as that of the small tappa in which Sohgaura, and Tikar, where I recovered the Indo-Pali Copper-plate, are situated.

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[1] Wainaban is clearly the Vinayaka-vana, the forest of discipline (Vinaya), a parallel to the dharmāraṇya of the Hindus and Buddhists.

Bharuhia lies west of Tighra near Peppeganj railway station. Here there is a very ancient temple which has been restored, or repaired, and in one wall of it there is a stone containing a Sanscrit inscription. The temple is called Pitesar Nath. The proper form of the name occurs in the inscription. There was another ancient building in ruins east of Bharuhia called Nakta Dei, which some Tharus overturned about 60 years ago, when they came in a body and searched for treasure.

There are other places which might repay examination, for instance Gāngpār and Khātapār near Bharuhia and Tighra. West of this there is a series of almost continuous village sites: Rāmghat, Pallia, Pachwāra, Dihwa and Ramwapur, in each of which there are ruins. They seem to be a connected block, as though they were the site of one continuous city.

In order, if possible, to discover what was the *Vijayapura* referred to in the copper-plate, I made enquiries as to old sites in this neighbourhood, and I came to find that there are round about Gorakhpur the following remains of ancient fortified posts, which it may be as well to record. (1) *Shergarh* west of the Rapti and of Gorakhpur much cut away by the river. (2) *Ramgarh* which gives its name to a large lake east of Gorakhpur city. (3) *Sumergarh* north of Bhathat about 13 miles north of Gorakhpur. (4) *Bheriagarh* north-east of Gorakhpur city. (5) *Baitalgarh* on some high ground near the road leading from Gorakhpur to Pipraich. (6) *Marwargarh* near the shrine of Tarkulha Devi two miles north-east of Mirzapur village. (7) *Kuwalgarh* at *Kawaldah* in the immediate north of Gorakhpur city. (8) *Domangarh* on the Rapti, west of Gorakhpur city. (9) *Bijaigarh* known as Kotiya, standing in the big sheet of water west of the now ruined Mahesra bridge south of Maniram railway station.

There is a tradition of two kingdoms Bijaipur and Udaipur. A line drawn from Padrauna westward to the Rapti would about indicate the parting line. North of it lay Udaipur and south of it Bijaipur. I am not inclined to say that all the nine forts enumerated were simultaneously existent as fortified posts of the Bijaipur kingdom. Local traditions show that this could not have been so; but the existence of so many of these ancient strongholds, round about the junction of the Rohiṇī and Rapti rivers, shows that the position was recognized from the earliest times as one of strategic advantage."

The inscription is engraved on a single copper-plate measuring 12¾" by 12¾." On the top there is an oval projection, upon which we find the representation of full-blown lotus, the centre of which consists of a raised disc bearing the image of some animal, perhaps a boar, with *Çrī-Jayāditya-devaḥ* written below in raised characters. The writing consists of 24 lines, covering only three quarter of one side of the plate. It is fairly well executed and well preserved; however, the meaning of a few passages remains doubtful. The characters belong to the northern alphabet and are in every respect similar to those of the Gorakhpur plate of the same king, belonging to this society, and edited by Prof. Kielhorn in the *Ind. Ant.* Vol. XXI, 1892, p. 169 ff. Thus, in the conjunct letter *rya* the *r* is written on the line in *paryanta* (ll. 1 & 12), and *kāryā* (l. 19); and the *anusvāra* is placed after not above the *akṣara* to which it belongs in *pravṛttīnāṁ* (l. 5), and *bhūbhujāṁ* (l. 19). The language is Sanskrit, and with the exception of four imprecatory and benedictive verses in ll. 17-21, and a verse referring to the grantee, the Kāyastha Keçava in ll. 22-24, it is in prose.

The object of the Inscription was to record a grant made by king Jayādityadeva II. (l. 8), who was the son of Dharmmādityadeva and his wife Candrādevī (l. 4) and the grandson of Jayādityadeva I. and his wife Yogādevī (ll. 3 & 4), all of whom belonged to the Malayaketu family (l. 3) and received the titles *paramabhaṭṭāraka-mahārājādhirāja-parameçvara.* The document was issued from Vijayapura (l. 1). The grant consisted in the village Kumārasaṇḍikā, connected with the *pallikās:* Patrasaṇḍā, Çaṇkusaṇḍā, Gāddhī, and Deulī, which lay in the Leḍḍikā *viṣaya* and the Daddaraṇḍikā *maṇḍala* (l. 8). It was given to a *Kāyastha* Keçava, son of a *Kāyastha* Dhemuka, and grandson of a *Kāyastha* Rudra, in recognition of good services rendered by him to the king (l. 13). Its boundaries are laid down in l. 15; they were: in the east the river Rohiṇī; in the south a *tilaka* tree; in the west the ditch called Hastilaṇḍa; in the north a *kumbhī* tree. The document is signed by the minister (*mahāmantri*) Māhaka. The *mahāsāmanta* Grahakuṇḍa acted as *dūtaka.* The inscription was written by the *Kāyastha* Valadduka. Its date is given as *Samvat* 921 (ll. 21-22).

The date doubtless must be referred to the Vikrama era. Of the geographical names mentioned in this inscription, the river Rohiṇī is the only one that at present can be identified. As regards Vijayapura, we learn from the Gorakhpur Inscription (*l.c.* p. 170) that it was situated on the slopes of the Himalaya (*uttaragiri-kaṭake*).

I now edit the inscription from the original plate:—

Transcript.

l. 1, Oṁ Svasti | Çrī-VIJAYAPURĀC=catur-udadhi-paryanta-nirantar-
ākrānta-kīrtti-santatīnām=ananta-nitānta-phal-ānumeya-
āravdha(bdha)-vividha-kṛtyānāṁ jagad-udayāya gṛhi-

l. 2, ta-dṛḍha-vratānām=ati-saṁrūḍha-rājarṣi-patha-sampravart-
tayitṝṇāṁ samantād-gṛhita-pūrvva-niti-vyavahārāṇāṁ
prajānām=upakarttavyam=ity=evam=ādṛta-matiḥ[1]

l. 3, samastetikāyo[2]MALAYAKETŪNĀM=anvaye ‖ paramabhaṭṭāraka-
mahārājādhirāja-parameçvara-çrī-JAYĀDITYADEVAS=tat-pu-
tras=tat-pād-ānudhyāto mahādevyāṁ rājñī-

l. 4, çrī-YOGĀDEVYĀṀ samutpannaḥ paramabhaṭṭāraka-mahārājā-
dhirāja-parameçvara-çrī-DHARMMĀDITYADEVAS=tat-putras=
tat-pād-ānudhyāto mahādevyāṁ rājñī-çrī-CA-

l. 5, NDRĀDEVYĀṀ samutpannas=sahajasya vidyā-janitasya ca saṁ-
skārasy=ādhāro dharmm-ārtha-kāma-viruddhānām=indri-
ya-pravṛttīnāṁ sanniroddhā prāyeṇa vikram-aika-ras-ā-

l. 6, bhiprāya-vāda-bhidyamāna-pracaṇḍ-ārāti-maṇḍalō naya-
vinaya-prasādhit-āçeṣa-bhū-maṇḍalaḥ sarvva-daiv-ākhaṇ-
ḍita-matir=Ākhaṇḍala-tulya-tejā rājabhiḥ

l. 7, çiro-bhiruhyamān-āpratihata-çāsanaḥ çāsanānāṁ pradātā
paramamāheçvaro Maheçvara iva sarvva-satva[3]-kṣema-tat-
paraḥ paramabhaṭṭāraka-mahārājā-

l. 8, dhirāja-parameçvara [4]-çrī=JAYĀDITYADEVAḤ kuçalī ‖ DADDARAṆ-
ḌIKĀ-maṇḍale | LEḌḌIKĀ-viṣay-āntarvvartti-KUMĀRAṢAṆḌI-
KĀ-grāme | Patraṣaṇḍā | Çaṅkuṣaṇḍā | Gāddhī | Deu-

l. 9, lī-pallik-ānvite | samupagat-āçeṣa-rājana(nya)ka-rājaputra-
rājasthānīya-purohit-āmātya-mahāsāmanta-mahāsāndhi-
vigrahika-mahāpratīhāra-mahākṣapaṭalika-mahādaṇḍanā-
yaka-

l. 10, pañcamaṇḍapādhipati-mauladāṇḍika-dāṇḍapāçika-mahāsā-
dhanika-cauroddharaṇika-çaulkika-gaulmikān ‖ anyāṇç[5]=c=
ākīrttitān=ā-cāṭa-bhaṭa-vra(brā)hmaṇ-ottara-jana-

l. 11, padanç=ca[6] yathārham=mānayati pūjayati vo(bo)dhayati
samājñāpayati ca[‖*] Viditam=astu bhavatām=ayam=upari-
likhita-grāmas=sa-jala-sthalas=s-āmra-m[adh*]ūkaḥ sa-
gartt-oṣaras=sa-

l. 12, loha-lavaṇ-ākaraç=catus-sīmā-paryantas=sva-pallik-opetaḥ
samasta-rājapratyādāya-samaveto bhūmicchidraka-nyāyen=

---

[1] Read-*matināṁ*.

[2] I am unable to make out the meaning of this word.

[3] Read *sattva*.

[4] Originally written *parameçvaraḥ*.

[5] Read *anyāṁç*.

[6] Read *padāṁç=ca*.

ā-candr-ārkka-kṣiti-sama-kālina[ṁ*] yāvat=pūrvva-bhuk-
ta-bhu-

l. 13, jyamāna-deva-vrā(brā)hmaṇa-kṣetra-khaṇḍito=smābhir=ati-
sev-ārādhitau(tai)ç=Caravāsaka-satka-kāyastha-RUDRA-
pautrāya kāyaspha(stha)-DHEMUKA-putrāya Siṅghapad-
dhateḥ kāyastha-

l. 14, KEÇAVĀYA | çāsanena prasādī-kṛtō matvā bhavadbhir=anu-
mantavyaṁ nivāsibhiç=c=ājñā-çravaṇa-vidheyī-bhūya
samucita-bhāga-bhog-ādikam=asya samupanetavyaṁ[||*]

l. 15, Tatra ca sīmāno likhyante | pūrvvasyāṁ diçi sīma-nirnna-
(rṇṇa)ya-kāriṇī Rohiṇī nāma nadī | dakṣiṇasyān=tu tilaka-
tarur=avatiṣṭhate | paçcimāyāṁ Ha-

l. 16, stilaṇḍ-ākhyaḥ khātaḥ | tath=ottarasyāṁ kumbhī-vṛkṣaḥ |
evañ=catasṛṣv=api dikṣu vibhakta-sīmakaṁ grāmam=pra-
sādī-kṛtya tat=kṣaṇam=eva nṛpati-

l. 17, r=idam=avādit | Va(Ba)hubhir[1]=vvasudhā dattā rājabhis=
Sagar-ādibhiḥ | yasya yasya ya lā bhūmis= tasya tasya tadā
phalaṁ | (||) Sva-dattāṁ para-dattām=vā yo hareta

l. 18, vasundharāṁ | sa viṣṭhāyāṁ kṛmir=bhūtvā pitṛbhis=saha
pacyate || Dattāyāḥ[2] paripālanaṁ bhavati yad=deva-dvije-
bhyo bhuva[s*]=tyāgas=tatra na ko=pi praṅga-

l. 19, mahatiḥ kāryānu(nta)ram=bhūbhujāṁ || (|) n=aiv=ānyaḥ para-
kīrtti-pālana-guṇo vyāçasyate kevalaḥ | īdṛçyāḥ(çyā)khalu
ve(vai) sadā vanāratā[ḥ*] stutyā stute(tās)=tyā-

l. 20, ginaḥ || Iti[3] kamala-dal-āmvu(mbu)-vindu-lolāṁ Çriyam=
a[nu*]cintya manuṣya-jivitañ=ca[|*] sakalam=idam=udāhṛ-
tañ=ca vudhvā(buddhvā) na hi puruṣaih para-

l. 21, kīrttayo vilopyāḥ | (||) Jñātam=mahāmantri-çrī-MĀHAKENA
mahattara-çrī-Vappeka-sutena[||*] Dūtako=tra mahāsā-
manta-çrī-GRAHAKUṆḌAḤ | (||) Likhitañ=c=aitan=Mahā-

l. 22, nadi-putreṇa | Saiṅghapura-kāyastha-mahākṣapaṭalika-çrī-
VALADDUKEN=eti || Samvat 921[||*] Yena[4] grāma-turaṅga-
hema-surabhī-vastr-ādinā tarppitā viprā ye-

l. 23, na ca devatālaya-miṣeṇ=ākāri dharmm-occayaḥ | pūrṇṇaṁ
puṇya-jalais=taḍāgam=akarod=yaḥ kṣīra-sindh-ūpamaṁ
ten=edaṁ nija-çāsanaṁ karaṇika-çrī-KEÇAVEN=ārjjitaṁ

l. 24, ||

[1] Metre Anuṣṭubh; and of the next verse.

[2] Metre Çārdūlavikrīḍita; I am unable to correct all the mistakes occurring in this verse.

[3] Metre Puṣpitāgrā.

[4] Metre Çārdūlavikrīḍita.

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No. IV—1899.

On a collection of birds from Manipur.—*By* LIEUT. H. H. TURNER. Communicated by the Natural History Secretary.*

[Received September 27th; Read November 1st, 1899.]

These birds were all obtained between the latitudes of 25° and 24° 30′ and longitudes 95° and 93° 30′. The approximate latitude and longitude of the following places mentioned are given to the nearest minute :—

		Latitude.	Longitude.
Homalin	...	24° 52′	94° 58′
Kungalthana	...	24° 43′	94° 36′
Tamunga	...	24° 39′	94° 39′
Thyoliching	...	25° 0′	95° 46′
Khambiching	...	24° 46′	94° 24′
Maphitel	...	24° 51′	94° 15′
Kaupru	...	25° 4′	93° 55′

* I am responsible for the identification of the species herein recorded, and for the notes in brackets. Lieutenant Turner has with great generosity, presented several specimens (belonging to the species marked with asterisks) to the Indian Museum, including the pick of the collection such rarities as *Certhia manipurensis*, *Dendrocopus pyrrhothorax*, and *Microperdix manipurensis*. Nat. Hist. Sec., A.S.B.

Homalin is in Upper Chindwin, Upper Burmah, and is situated on the east bank of the river Chindwin; its height above sea level is about 450 feet. There is a lot of dense jungle in the neighbourhood.

Kungalthana is situated at the head of the Kabaw Valley and is just on the border between Burmah and Manipur at the S.-E. corner of the latter state. Hills covered with dense jungle rise to about 4,000 feet on the east and north. To the west the hills are less densely covered with jungle, but rise to 5,000 feet. To the south lies the Valley of Kabaw. All round Kungalthana there is dense jungle, though in places there are breaks with parklike stretches of grass. It is about 800 feet above sea-level.

Tamunga is a hill about 3,400 feet high and densely covered with jungle. It lies about 6 miles south of Kungalthana.

Thyoliching is a hill about 6,500 feet high, thickly covered with jungle, mostly bamboo. It is one of the highest points on the range of hills running more or less parallel to the Chindwin River on its west bank.

Khambiching is a hill about 5,700 feet high, situated in the Naga hills about 20 miles east of Manipur. This hill is not nearly so thickly wooded as most of the hills I visited and consequently a great deal more bird life was to be seen. All the Sunbirds were, I think, got in this neighbourhood. I never saw a minivet of any sort west of Khambiching.

Maphitel is a high hill about 6,700 feet high which overlooks the whole of the Manipur Valley, situated about 10 miles east of Manipur. It is very thickly wooded on all sides. Unfortunately my collector got ill here, and I was too busy to go out myself.

Kaupru is a high hill 8,400 feet high, to the North-West of Manipur; I did not visit this hill myself, but the Tragopans were got there.

The Logtak is a large lake about 10 miles south of the town of Manipur. There are thousands of duck and geese to be seen on its waters. The principal species that I noticed was the grey duck or spotbill. A few pintail, gadwall, shoveller, white eyed pochard (a few only). I saw no mallard, and I believe they are never obtained in the Manipur Valley.

DENDROCITTA RUFA. *The Indian Tree Pie.*

One, Homalin, November, 1898. One, Kungalthana, December, 1898.

DENDROCITTA HIMALAYENSIS. *The Himalayan Tree Pie.*

One, Khambiching, December, 1898.

PARUS CINEREUS. *The Indian Grey Tit.*

One, Kungalthana, December, 1898.

SCAEORHYNCHUS RUFICEPS. *The larger Red-headed Crow Tit.*

One, Thyoliching, December, 1898.

DRYONASTES RUFICOLLIS. *The Rufous-bellied Laughing Thrush.*

Two, Manipur Valley, March, 1899.

GARRULAX LEUCOLOPHUS. *The Himalayan White-crested Laughing Thrush.*

One, Thyoliching, December, 1898.

GARRULAX PECTORALIS. *The Black-gorgetted Laughing Thrush.*

Two, Tamunga, December, 1898.
Hume states that he never saw or heard this bird east of Manipur.

GARRULAX MONILIGER. *The Necklaced Laughing Thrush.*

One, Tamunga, December, 1898.
This was shot out of the same flock as the two *Garrulax pectoralis*, and bears out Hume's assertion that they go in mixed flocks.

POMATORHINUS SCHISTICEPS. *The Slaty-headed Scimitar Babbler.*

One, Thyoliching, December, 1898.

PYCTORHIS SINENSIS. *The Yellow-eyed Babbler.*

One, Manipur, March, 1899.

PELLORNEUM MANDELLII. *Mandelli's Spotted Babbler.*

One, Khambiching, December, 1898.

ALCIPPE PHAYRII. *The Burmese Babbler.*

One, Tamunga, November, 1898.

*LIOPTILA GRACILIS. *The Grey Sibia.*

Two, Khambiching, December, 1898.

SIVA CYANUROPTERA. *The Blue-winged Siva.*

One, Khambiching, December, 1898.

ZOSTEROPS SIMPLEX. *Swinhoe's White-eye.*

Two, Khambiching, January, 1899.

PTERUTHIUS ERYTHROPTERUS. *The Red-winged Shrike-tit.*

One, Mahlong River, November, 1898. One Tamunga, December, 1898.

AEGITHINA TIPHIA. *The Common Iora.*

One, Manipur, March, 1899.

CHLOROPSIS AURIFRONS. *The Gold-fronted Chloropsis.*

Two, Homalin, November, 1898.

CHLOROPSIS HARDWICKII. *The Orange-bellied Chloropsis.*

Four, Tamunga, December, 1898. One, Khambiching, December, 1898.

CHLOROPSIS CHLOROCEPHALA. *The Burmese Chloropsis.*

One, hills between Kungalthana and Chindwin River, November, 1898. Two, Tamunga, November, 1898.

MELANOCHLORA SULTANEA. *The Sultan Bird.*

Two, hills east of Kungalthana, November, 1898.
MINLA IGNEITINCTA. *The Red-tailed Minla.*
One, Khambiching, December, 1898.

HYPSIPETES PSAROIDES. *The Himalayan Black Bulbul.*

One, Khambiching, January, 1899.
Hume mentions having seen this species only once in the Naga hills.

*HEMIXUS FLAVALA. *The Brown-eared Bulbul.*

Three, Nampesa (5,000 feet), just west of Kungalthana.
Hume mentions this species as being common west of Manipur, but rare to the east.

*HEMIXUS MACLELLANDI. *The Rufous-bellied Bulbul.*

Six, Khambiching, January, 1899.

*ALCURUS STRIATUS. *The Striated Green Bulbul.*

Two, Khambiching, January, 1899.

OTOCOMPSA FLAVIVENTRIS. *The Black-crested Yellow Bulbul.*

Three, Tamunga, November, 1898.

*SITTA NAGAENSIS. *Austen's Nut-Hatch.*

Two, Khambiching, January, 1899.

SITTA FRONTALIS. *The Velvet-fronted blue Nut-Hatch.*

One, Shombui, Naga hills, November, 1898. One specimen, Tamunga, December, 1898.

CHAPTIA AENEA. *The Bronzed Drongo.*

One, Khambiching, December, 1898.

DISSEMURUS PARADISEUS. *The large Racket-tailed Drongo.*

One, Tamunga, December, 1898.

*CERTHIA MANIPURENSIS. *Hume's Tree-Creeper.*

One, Khambiching, January, 1896.

[Lieutenant Turner's specimen of this species quite bears out Messrs. Hume and Oates' opinion of its distinctness, as the buff throat and breast and longer bill are conspicuous at once. I should mention, however, that *C. discolor* also occurs in Manipur, as the Museum possesses a specimen procured there by Mr. R. D. Oldham.]

MEGALURUS PALUSTRIS. *The Striated Marsh-Warbler.*

Two, Manipur Valley, March, 1899.

PHYLLOSCOPUS PROREGULUS. *Pallas' Willow-Warbler.*

One, Khambiching, December, 1898.

PHYLLOSCOPUS SUPERCILIOSUS. *The Crowned Willow-Warbler.*

One, Khambiching, December, 1898.

LANIUS COLLURIOIDES. *The Burmese Shrike.*

One, Mahlong River, November, 1898.

LANIUS TEPHRONOTUS. *The Grey backed Shrike.*

One, Manipur, March, 1899.

PERICROCOTUS FRATERCULUS. *The Burmese Scarlet Minivet.*

Three, Kungalthana, November, 1898. Three, Tamunga, November, 1898.

PERICROCOTUS BREVIROSTRIS. *The Short-billed Minivet.*

One, Thyoliching, December, 1898.

*PERICROCOTUS SOLARIS. *The Yellow-throated Minivet.*

One, Tamunga, November, 1898. One, near Khambiching, December, 1898.

CAMPOPHAGA MELANOSCHISTA. *The Dark-grey Cuckoo-Shrike.*

Two, Thyoliching, December, 1898.

GRAUCALUS MACII. *The Large Cuckoo-Shrike.*

One, Tamunga, November, 1898. One, near Khambiching, November, 1898.

ORIOLUS MELANOCEPHALUS. *The Indian Black-headed Oriole.*

Two, Homalin, November, 1898. One, Kungalthana, November, 1898.

ORIOLUS TRAILLII. *The Maroon Oriole.*

One, Tamunga, November, 1898.

AETHIOPSAR GRANDIS. *The Siamese Myna.*

One, Kungalthana, December, 1898.

SIPHIA STROPHIATA. *The Orange-gorgetted Flycatcher.*

One, Khambiching, December, 1898.

SIPHIA ALBICILLA. *The Eastern Red-breasted Flycatcher.*

One, Kungalthana, November, 1898.

CYORNIS CYANEUS. *The White-tailed blue Flycatcher.*

One, Thyoliching, December, 1898.
The Grey headed Flycatcher.
One, Khambiching, December, 1898.

PRATINCOLA MAURA. *The Indian Bush Chat.*

One, Manipur Valley, March, 1899.

OREICOLA FERREA. *The Dark grey Bush Chat.*

One, Tamunga, November, 1898. One, Manipur Valley, March, 1899.

HENICURUS IMMACULATUS. *The Black-backed Forktail.*

One, Kungalthana, November, 1898.

CHIMARRHORNIS LEUCOCEPHALUS. *The White-capped Redstart.*

One, Naklang River, December, 1898.

RHYACORNIS FULIGINOSUS. *The Plumbeous Redstart.*

One, Kungalthana, November, 1898.

IANTHIA RUFILATA. *The Red flanked Bush Robin.*

One, Khambiching, December, 1898.

COPSYCHUS SAULARIS. *The Dhayal or Magpie Robin.*

One, Manipur Valley, March, 1899.

KITTACINCLA MACRURA. *The Shama.*

One, Tamunga, December, 1898.

PETROPHILA CYANUS. *The Western Blue Rock Thrush.*

Two, Manipur Valley, March, 1899.

MYCEROBAS MELANOXANTHUS. *The Spotted-winged Grosbeak.*

One, Khambiching, January, 1899.

EMBERIZA AUREOLA. *The Yellow-breasted Bunting.*

Four, Manipur, March, 1899.

ANTHUS MACULATUS. *The Indian Tree Pipit.*

One, Mablang River, November, 1898.

AETHOPYGA IGNICAUDA. *The Fire-tailed yellow-backed Sunbird.*

One, Khambiching, December, 1898. Two, Khambiching, January, 1899.

AETHOPYGA GOULDIÆ. *Mrs. Gould's yellow-backed Sunbird.*

Four, Khambiching, January, 1899.

AETHOPYGA DABRYI. *Dabry's yellow-backed Sunbird.*

One, Chattah, Naga Hills (near Thyoliching). Two, Khambiching, January, 1899.

AETHOPYGA NEPALENSIS. *The Nepal yellow-backed Sunbird.*

Two, Khambiching, December, 1898.

*ARACHNOTHERA MAGNA. *The Large streaked Spider-Hunter.*

Four, Tamunga, December, 1898.

GECINUS OCCIPITALIS. *The Black-naped green Woodpecker.*

One, Tamunga, November, 1898.

GECINUS CHLOROLOPHUS. *The Small Himalayan yellow-naped Woodpecker.*

One, Tamunga, 1898.

*DENDROCOPUS PYRRHOTHORAX. *The Red-breasted pied Woodpecker.*

One, Khambiching, December, 1898.

[Lieutenant Turner's specimen of this rare species agrees well with Colonel Godwin-Austen's obtained at Aimole, Manipur and still in the Museum.]

DENCROCOPUS ATRATUS. *The Stripe-breasted pied Woodpecker.*

Two, Khambiching, January, 1899.

IYNGIPICUS CANICAPILLUS. *The Burmese Pigmy Woodpecker.*

One, Khambiching, January, 1899.

*TIGA SHOREI. *The Himalayan Golden-backed three-toed Woodpecker.*

One, Khambiching, December, 1898.

[This specimen has a rudimentary hallux, similar to, that of *Brachypternus aurantius*, but without a nail. As this rudiment is also present in a pair from Landour in the Asiatic Society's Collection of stuffed specimens,* and in a skin from Bhamo collected by Dr. J. Anderson—which are all I have been able to examine——it looks as if it were characteristic of the species, and hence I fail to see how this can be kept separate from *Brachypternus*.]

CHRYSOCOLAPTES GUTTICRISTATUS. *Tickell's Golden-backed Woodpecker.*

One, Kungalthana, November, 1898.

MEGALAMA MARSHALLORUM. *The Great Himalayan Barbet.*

One, Khambiching, January, 1899.

THEREICERYX LINEATUS. *The Lineated Barbet.*

One, Homalin, November, 1898.

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* Not entered in Blyth's catalogue, though the stands bear labels in his handwriting.

CYANOPS ASIATICA. *The Blue-throated Barbet.*

Three, Tamunga, December, 1898. One, Khambiching, January, 1899. Two, Manipur Valley, March, 1899.

CYANOPS FRANKLINI. *The Golden-throated Barbet.*

Two, Khambiching, in January, 1899.

CORACIAS AFFINIS. *The Burmese Roller.*

Two, Manipur Valley, March, 1899.

CERYLE VARIA. *The Indian pied Kingfisher.*

One, Manipur Valley, March, 1899.

HALCYON SMYRNENSIS. *The White-breasted Kingfisher.*

Five, Manipur Valley, March, 1899.

ANTHRACOCEROS ALBIROSTRIS. *The Indo-Burmese pied Hornbill.*

Two, Homalin, November, 1898.

HARPACTES ERYTHROCEPHALUS. *The Red-headed Trogon.*

Two, Thyoliching, December, 1898.

SURNICULUS LUGUBRIS. *The Drongo Cuckoo.*

One, Homalin, November, 1898.

CENTROPUS SINENSIS. *The Crow pheasant or Coucal.*

One, Manipur Valley, March, 1899.

PALÆORNIS ROSA. *The Eastern Blossom-headed Parrakeet.*

One, Homalin, November, 1898.

PALÆORNIS FASCIATUS. *The Red-breasted Paroquet.*

One, Maphild, January, 1899.
I also obtained two live specimens, male and female; the latter I have still, the former escaped.

ACCIPITER NISUS. *The Sparrow Hawk.*

One, Manipur Valley, March, 1899.

ACCIPITER VIRGATUS. *The Besra Sparrow Hawk.*

One, Manipur Valley, March, 1899.

TINNUNCULUS ALAUDARIUS. *The Kestrel.*

Four, Manipur Valley, March, 1899.

*MICROHIERAX EUTOLMUS. *The Red-legged Falconet.*

One, Homalin, November, 1898. Three, Kungalthana, November, 1898.

TRAGOPAN BLYTHI. *The Grey-bellied horned Pheasant.*

Three, Kanpru, March, 1899.

EXCALFACTORIA CHINENSIS. *The Blue-breasted Quail.*

One, Kaupum (Manipur Silchar Road), March, 1899. One, Manipur, March, 1899.

COTURNIX JAPONICA. *The Japanese Quail.*

One, Manipur Valley, February, 1899.

I saw a dozen or so of these birds; they were driven out of the long grass as it was burning. I thought at the time they were common quail, or would have taken more trouble to obtain another specimen.

*MICROPERDIX MANIPURENSIS. *Hume's Bush Quail or Manipur Quail.*

Five, Manipur Valley, February, 1899.

Two out of the five of these birds were obtained almost in the dark, whilst running on the ground, they could be heard calling at one's feet almost, but the grass on the spot where they were having only that afternoon been burnt they were very hard to distinguish. The other three were obtained on a different day and were driven out of the long grass by fire. [See the note on this species by Captain H. S. Wood, I.M.S., J.A.S.B., Pt. II, 1899, p. 110].

ARBORICOLA RUFIGULARIS. *Blyth's Hill Partridge.*

One, Sirohipuras, January, 1899.

TURNIX PUGNAX. *The Bustard Quail.*

One, Manipur Valley, March, 1899.

AMAURORNIS PHŒNICURUS. *The White-breasted Water-hen.*

One, Logtak, March, 1899.

GALLICREX CINEREUS. *The Kora or Water-Cock.*

One, Logtak, March, 1899.

SARCOGRAMMUS ATRONUCHALIS. *The Burmese Wattled Lapwing.*

One, Manipur Valley, March, 1899.

HOPLOPTERUS VENTRALIS. *The Indian Spurwinged Plover.*

One, Kungalthana, November, 1898.

ARDEOLA GRAYI. *The Pond Heron or Paddy Bird.*

One, Manipur Valley, March, 1899.

*NYROCA FERRUGINEA. *The Western White-eyed Pochard.*

One, Logtak. One, Manipur. [This shows that the Western White-eye does occur in Manipur, as stated by Hume, and doubted by Mr. E. W. Oates. (Game Birds of India, Vol. II, p. 331). I may mention that the Eastern species (*N. baeri*) is again scarce this cold season at Calcutta].

PODICIPES CRISTATUS. *The Great crested Grebe.*

Two, Logtak, March, 1899.

These birds are by no means uncommon on the Logtak between November and February; the above specimens were rather late sojourners.

PODICIPES ALBIPENNIS. *The Indian Dabchick.*

One, Logtak, March, 1899.

These were very numerous on the Logtak.

Akakia: an Ancient Eastern Medicine.—*By* DAVID HOOPER, F.C.S.

A substance called Akakia or Aqāqiyā is described in both old and modern works on Indian Materia Medica, and is occasionally found in the bazars of this country.

Dioscorides and Hippocrates are said to have described it as the juice of a prickly tree and lauded its properties. Dr. Dymock avers that this plant is mentioned by Theophrastus (iii. 4; iv. 3; vi. 1) under the name of ακανθος, and that Virgil (*Georg.* ii. 119) speaks of the same acanthus in the line "baccas semper frondentis acanthi," no doubt in allusion to the globular inflorescence of the tree.

The botanical origin of the drug from the earliest records appears to be a bush or tree yielding an exudation similar to gum arabic. According to Arabian and Persian writers, the tree from which it is prepared is called "Karaz." This is the fruit of *Acacia nilotica* of Delile

(*Fl. Ægypt.*, i. 963), the *Acacia vera* of Vesling (*Ægypt.*, p. 9, *Icon*), and is known as "Sant" among the Egyptians. These are all vernacular names and synonyms of one or more species, including *Acacia arabica*, the common *babūl* tree of this country.

This is not the first time a paper has been read before this Society on the subject of this remarkable medicine. In 1837 a communication was made by Mr. Lewis DaCosta, which consisted of a translation of the article on "Aqaqia" in the Makhzan-al-Adwiyah of Mahomed Khosru Khan. (*See Journal Asiatic Society of Bengal*, Vol. VI. part I, January to June, 1837, p. 392). No reference was made in the paper to the uses of the drug at that time, nor were any opinions offered as to the condition of the article as it was then sold or the estimation in which it was held by the people. Regarding the preparation of the extract, Pliny (24, 67) says that "the juice is left to thicken in the pods, which are steeped in rain water for the purpose, and then poured into a mortar, after which the juice is extracted by means of presses. It is then dried in the sun, and when dry, divided into tablets."

The method of preparing the extract, according to the Makhzan, is as follows:—The fresh, unripe fruits should be employed. These are bruised in a mortar, boiled in water over a gentle fire until the mixture assumes a thick consistence, then it is poured into moulds and set aside to dry, after which it is ready for use. Some authorities are careful in pointing out that the desiccation of the extract should be effected under the influence of the sun's rays, as a much superior preparation is supposed to be produced under these circumstances. The expressed juice, after a certain degree of concentration, is sometimes poured into bladders in which it is allowed to harden.

The little bladders full of Akakia found in Europe contain about five or six ounces each. That it was not unknown on the Continent in the early part of last century is evidenced by the fact that "Doctor Akakia" is the pseudonym under which Voltaire overwhelmed with redicule Maupertuis a companion of Frederick the Great.

The drug reaches India *viâ* Bombay, and is imported into this city from the Red Sea ports and the Persian Gulf. It is sold in the bazars of Bengal and Bombay either in very thin black cakes about the size of a rupee, or in larger cakes two inches in diameter and half an inch in thickness. The wholesale price is two sērs for a rupee, and the commodity retails for about 1½ anna per chittak.

Various observers have noticed a difference in the character of the drug as sold in this country. It is usually a solid, heavy, brittle, dark coloured substance without any odour; the taste is insipid or sweetish at first, then astringent; it breaks with a shining fracture, and may be reduced to a brown powder; it is partly soluble in water forming a red coloured mucilaginous liquid, leaving behind a quantity of brownish-green matter. Small fragments held up between the eye and the light have a reddish tinge similar to the glass of hock bottles. Other samples are coal black and quite insoluble in water.

Mohideen Sheriff, Khan Bahadur, a distinguished Muhammadan practitioner in Madras, discusses very fully in his "Materia Medica of Madras," the appearance, preparation and therapeutic uses of this extract. He describes two varieties met with in that city—a hard and a soft variety. The hard kind is black and brittle, like the substance described above; the soft kind is reddish or deep brown in colour, and even after being kept for a long time, it is sufficiently tough and plastic to be made into boluses. He considers all the hard varieties to be impure or not at all made from the pods of an *Acacia*. An extract made by himself from fresh pods had a soft consistence, an astringent taste, and a slight, peculiar odour.

I would not attempt to enumerate in this paper all the medicinal virtues ascribed to this drug. It has been used in the East, especially among the Muhammadan community, as a panacea. It is supposed to be cold and dry, astringent, styptic and tonic, and is used internally and externally in relaxed conditions of the mucous membranes. It is recommended for nervous debility, dysentery, diarrhœa of children, and as a collyrium in purulent conjunctivitis. Applied as a lotion to the face it is said to improve the complexion, and to grey hair to give a black colour. Made into an ointment with beeswax, or mixed with white of egg, it has been used for burns, scalds, inflammation and erysipelas; and in a powdered state it arrests hæmorrhage.

Further details of the effects said to result from the administration of this medicine will be found in Mr. DaCosta's translation of the chapter from the Makhzan, or in Dr. Mohideen Sheriff's work.

It will be well to turn our attention to the source of this wonderful medicament and endeavour to trace the origin of the useful therapeutic properties attributed to it.

Babūl pods are used in India chiefly in two connections. Firstly, they are astringent, and are employed for tanning leather and making ink; and secondly, they are employed by native agriculturists for feeding and fattening cattle. No poisonous action has been recorded concerning the pods, and no active alkaloid has been detected in them. The tannic acid peculiar to the *babūl* is one of the pyrogallol series, which affords a blue-black colour with persalts of iron.

Babūl or *bablah* pods have been analysed on various occasions by chemists, with the object, in most cases, to determine the amount of tannic acid present. V. Wilbuszewitcz, in 1886, estimating the acid by means of potassium permanganate, found 12·12 per cent., and by treatment with sulphuric acid, phlobaphene, ellagic and gallic acids were obtained as decomposition products.

Kay and Baston, by employing Procter's modification of Löwenthal's process for the estimation of tannin, found 22·44 per cent. in the pods. (Allen, *Commercial Organic Analysis*).

Marfat states that Bablah pods contain from 25 to 30 per cent. of tannin, analogous to that of nut-galls, besides a free acid and a large quantity of calcium salts.

During a chemical examination made in 1898, of a sample of *babūl* pods collected in Bengal, I obtained 20·65 per cent., as the average of two concordant estimations. The complete analysis was as follows :—

Water	6·87
Tannic acid	20·65
Non-tanning soluble matters ...	15·15
Fibre	51·40
Ash	5·93
	100·00

A solid extract was afterwards made by exhausting the crushed pods with warm water at 60° C., and evaporating the reddish-brown liquid in a porcelain basin until it was dry. This extract, which should represent the Persian and Arabian drug, Akakia, was a dark brown, solid mass, almost entirely soluble in water, and possessing a strongly astringent taste. Its chief constituents were found to be—

Water	5·58
Tannic acid	59·80
Non-tanning soluble matters... ...	16·00
Insoluble substance	8·17
Ash	10·45
	100·00.

This, it will be noticed, is a highly astringent preparation, and resembles in its composition one of the forms of cutch manufactured for tanners from the wood of *Acacia Catechu.*

It was thought probable that the fruit of the *babūl* tree might contain an allied principle to that contained in the *Acacia concinna*, or soap-bean of South India, but no appreciable amount of a saponin-like body could be detected in the Bengal pods.

With a knowledge of what an extract of *babūl* pods should be, the light of chemical inquiry was next directed towards the composition of trade samples of Akakia. Three specimens are exhibited in the Indian Museum, two of which are in the form of round black cakes, and one in a hard yellowish, resin-like mass.

One of the black cakes, obtained from the Panjab, merely softened in hot water, without dissolving. On igniting a small quantity on platinum foil, it burnt with a dense smoky flame, and left a residue of 58 per cent. of mineral matter. It had all the characters of pitch or asphalt. Another sample of the same shape and colour, but obtained from Bengal, was similar in appearance to that from the Panjab. It consisted of a pitch-like, resinous material, and yielded when ignited about 45 per cent. of siliceous ash. The third specimen labelled "from Hyderabad," was a vitreous substance of a yellowish-brown colour. It was composed of gum, resin, vegetable debris and sand. It afforded no reactions for tannin, and, like the previous samples, was altogether foreign to the products of species of *Acacia*.

Since these samples were examined a further attempt has been made to procure in Calcutta a genuine specimen of this extract, but from the diversely coloured and resinous articles supplied under this name it is evident that entirely different substance are regularly being sold by the bazar druggists in place of the once renowned Akakia.

The local specimens, of which there are three in number, are coloured respectively black, green and light brown. The black cake bears a resemblance to those previously described, but closer examination showed that the resinous principle consisted of shellac, while the other constituents were charcoal, and a liberal allowance of sandy mineral matter amounting to two-thirds of the weight of the whole.

The light brown specimen is a pure resin, and is no doubt allied to Olibanum, many varieties of which are obtained from species of *Boswellia*. The green lump is probably the same compound mixed with colouring matter. Olibanum seems also to be the basis of the resinous ingredient present in the Bengal variety.

The result of this inquiry shows a state of affairs which deserves explanation. Either the native apothecary is entirely ignorant of the nature of some of the drugs he dispenses, or he is recklessly or fraudulently practicing a system of substitution. The condition of the trade in the time-honoured drug Akakia is far from satisfactory, and it is only by practical investigations in this direction that we can hope to remedy it.

Notes on the Ploceidæ.—*By* F. FINN, B.A., F.Z.S., Deputy Superintendent of the Indian Museum.

[Received November 29th; Read December 6th, 1899.]

1. *Ploceus rutledgii*, Finn, the summer plumage of *Ploceus megarhynchus*, Hume.
2. On the interbreeding of certain species of Munia.
3. An attempt at a natural subdivision of the Ploceine Finches.
4. Some experiments on Sexual Selection in the Avadavat.

1. PLOCEUS RUTLEDGII, THE SUMMER PLUMAGE OF P. MEGARHYNCHUS.

In the Proceedings of the Asiatic Society for July 1899, p. 77, will be found the diagnosis of an Indian species of Weaver-bird which I there named, believing it to be new, *Ploceus rutledgii*, after Mr. W. Rutledge, from whom the types were obtained. Mr. Rutledge would not sell the birds until assured that they would not be killed, and I am glad to say that his humanity has been justified by a very interesting occurrence. The birds, being kept alive, have in due course assumed an undress plumage very similar to that of the ordinary Bayas (*P. baya* and *P. atrigula*) but differing from this in most of the points which Mr. Hume pointed out as distinctive of his *P. megarhynchus*. As they also agree closely with this form in measurements, and were obtained from Nynee Tal (the types of *P. megarhynchus* having come from Kaladoongi, below that place) it seems to me obvious that my *P. rutledgii* is merely the summer plumage of that species, hitherto unknown, no doubt, by reason of the unhealthiness of its Terai habitat in the season when the birds are in full feather. Under the circumstances the promised plate seems to me unnecessary, and therefore I merely append below a description of this summer or breeding-plumage.

General colour bright yellow (brightest on head and dull and impure on rump), with the following exceptions;—lores, round the eye below, and ear-coverts, dark brown; a dull-black patch on each side of the breast before the shoulder; nape and hind neck, dull blackish brown; upper back, wings, and tail blackish brown, each feather edged, entirely or externally, with light brown, on the uppermost part of the back with yellow; under wing-coverts dirty white.

Iris bright light brown; bill black, fleshy-white at base; feet dark brownish fleshy, claws blackish horny.

Both specimens, as noted in P.A.S.B. (*loc. cit.*) were similar, but one was slightly duller than the other. It is also slenderer in make, though quite as long, and has never sung or attempted to weave, even when separated from its fellow, which continually uttered, when "in colour," its harsh unpleasant song, and was an indefatigable weaver when it got grass to work with; it used to stuff bits of earth in the work. It still occasionally sings and weaves, and sometimes flies wildly about, as it often did when in colour. The other bird has always been much milder in demeanour, though more restless, and less tame. It was nearly a month later in completing its change of plumage; but latterly I have seen it also behave more like a normal male.

The brightest bird, the singer and weaver, measures; length about 6½″; bill from gape about ·8″; wing about 3″; tail about 2·1″; shank about ·95.″ The tail is much more graduated in winter than in summer plumage, and the bill is in the former fleshy, horny on culmen and tip, instead of black as in the full-plumaged bird.

It may be noted as a remarkable fact that, though the primaries of these birds had been plucked before they came into Mr. Rutledge's possession, and grew again soon after the specimens were acquired by the Museum, yet these new quills were again moulted and replaced in the ordinary way with the other feathers.

A very characteristic point of *Ploceus megarhynchus* is the long tail and short wing; as is shown by the measurements of this specimen and of Mr. Hume's, the difference between the length of the wing and tail is only about the length of the shank; in this point, as well as in the large amount of yellow in the plumage, *P. megarhynchus* approaches *Plocĕella javanensis.* It also possesses, like that species, nuchal hairs, but so do all the Indian species of *Ploceus*, though the absence of these insignificant filo-plumes is given, both by Mr. Oates in the Fauna of British India (Birds, vol. II, p. 174) and Dr. Sharpe in the British Museum Catalogue of Birds (vol. XIII, p. 406) as a character of the genus *Ploceus* as restricted by them.

It is not surprising that these authorities both united *P. megarhynchus* with *P. atrigula*, for no doubt there is a certain amount of intergradation between them, similar to that which occurs between *P. atrigula* and *P. baya*, as noticed by Mr. Hume (Stray Feathers, vol. VI, 1878, p. 400).

There are in the Indian Museum several specimens of *P. atrigula* showing an admixture of yellow with the buff of the breast, some of them procured by myself in Calcutta alive and kept so for a time to see if they would develop more of the yellow colouring—which they did not. Had I remembered this when I looked up *P. megarhynchus* and found that the types were in winter plumage and had been united with *P. atrigula* by the distinguished authors of the volumes of the "Fauna" and the "Catalogue" above quoted, I might have escaped following their very pardonable mistake which suppressed this magnificent species, by far the finest of the Asiatic Weavers.

Excluding, then, the two very easily distinguishable species *P. bengalensis* and *P. manyar*, typical males in summer plumage, of the remaining species, may be distinguished as follows:—

Size largest; entire under-surface yellow, ... *P. megarhynchus.*
,, smaller; throat blackish; breast buff, ... *P. atrigula.*
,, smallest; throat dull black; breast yellow,
abdomen white ... ... *P. baya.*

For the distinction of males in undress and females size will be the best guide, though this may not be very reliable in view of the probable occurrence of many intermediate specimens.

2. ON THE INTERBREEDING OF CERTAIN SPECIES OF MUNIA.

In January, 1897, I procured alive, in Tiretta Bazaar, Calcutta, a specimen of a Munia agreeing with *Munia malacca* in its general characters, but having the white portions of the plumage suffused with chestnut, and during the present year I have detected in cages of *M. malacca* many specimens showing more or less of this rufous colouration below, and have secured some for the Museum.

It is this occasional variation of the white lower parts, no doubt, which is alluded to by Mr. E. Bartlett (Monograph of the Weaver-birds, &c.), under this species, in his description of the female, which, he says, has "the white chest and sides strongly tinged with creamy-buff." But among the rufous-washed specimens procured by me most turned out to be males, while even the small series at present possessed by this Museum of the pure *M. malacca* shows that the underparts of the female are white like those of the male, as stated by Dr. R. B. Sharpe (Brit. Mus. Cat. Birds, vol. XIII, p. 331) and implied by Dr. A. G. Butler (Finches and Weavers in Captivity, p. 244).

This colouration is evidently not a stain (like the rusty tinge on the under-plumage of waterfowl, which I have seen assumed in a single night by a male Pintail (*Dafila acuta*) kept unpinioned on the Museum tank, which he used to leave and return to). I conclude this to be the case from finding the other birds in the cages with the tinted ones to be clean and pure white, and from the fact that immature birds still showing the light-brown plumage *moult out* either rusty or pure white below, according to the colours shown at first. I have tested this in three specimens kept by Major Alcock in his aviary, two of which have proved to be hens, and one a cock.

This departure from the typical colouration of *M. malacca* is no doubt caused by casual interbreeding with the nearly allied *M. atricapilla*, and a similar explanation would no doubt apply to the yellow-marked specimens of *Ploceus atrigula* alluded to above. It would, however, be satisfactory to have the fact placed beyond doubt by pairing the two species in captivity, which might easily be done. At the same time, in confirmation of the interbreeding theory, it may be mentioned that Dr. Butler in the work above quoted (p. 220) cites Dr. Karl Russ to the effect that the African *Aidemosyne cantans* and its very near ally the Indian *A. malabarica*, which do not meet in a wild state, interbreed indiscriminately in captivity. In view of cases like these, and of the fact that extreme forms of intergrading species, such as *Corvus corone* and *C. cornix*, and *Coracias indica* and *C. affinis* are positively known to pair up together, I cannot accept the theory that such intermediate specimens as occur midway in the range of intergrading forms represent the parent species in its as yet undifferentiated form, as has been advanced by some naturalists. For the progenitor of two given species need not have necessarily been an absolutely intermediate type, though the hybrid may be so, as has been proved by experimental breeding. For instance, we may presume that the ancestor of two species the males of which exhibit decorative colours, would have resembled the duller females and young of the existing forms; *e.g.*, the primitive ancestor of the common Bullfinch (*Pyrrhula europæa)* no doubt resembled *P. murina* of the Azores, and that of the Linnet (*Linota cannabina*) the duller coloured Twite (*Linota montium*). Yet when these two Finches are crossed in captivity, the "mule" has a pink breast, a piece of decorative coloration which was almost certainly absent in the common progenitors of the Bullfinch and Linnet genera.

Lastly there is strong reason to suspect that species arise suddenly as far as colour-variations are concerned. The Red-headed form of the beautiful Gouldian finch (*Poephila mirabilis*), is an example, and is especially interesting as showing how such sports may tend to increase, as it has been found by Dr. Butler to be more attractive to the hen than the less brilliant black-headed variety. (*Op. cit.* p. 176).

3. A SUGGESTION FOR A MORE NATURAL CLASSIFICATION OF THE PLOCEIDÆ.

Considering that this group of Passerine birds has been studied far more thoroughly than any other, being well known in captivity (in which state many species breed) it is rather remarkable that ornithologists have not availed themselves to a greater extent of the exceptional opportunities thereby afforded them of arriving at a natural classification of the group. As a matter of fact, any one who has studied these birds in life will see that the greater or less development of the first primary can hardly be deemed a character of importance as contrasted with the marked difference of colouration, general size, and habits, which separate the true Weavers, with their near allies the Whydahs, on one hand, from the Munias or Mannikins, Grassfinches and Waxbills on the other. We can hardly hope for anatomical characters of distinction in such a group as the Oscinine Passeres, and so in my search for a structural character to separate these sections, already partially indicated by Gray in the "Hand List" and by Dr. Butler in his valuable work, I studied our collections in the Indian Museum with a view to discovering an external one which should be correlated with the peculiarities of plumage and disposition so long familiar to fanciers. This I have found, I think, in the prolongation of the culmen on to the forehead, which obtains in Weavers and Whydahs to a far greater extent than in the Mannikins, Waxbills, and Grassfinches. I should therefore diagnose the two groups as follows :—

A. Posterior end of the culmen produced back upon the forehead, so that the length from its hinder end to a point midway between the nostrils exceeds the breadth of the bill at this point, and a line drawn between the nostrils forms the base of an isosceles triangle .... Weavers and Whydahs — *Ploceinæ.*

This group averages much larger than the others, some of its members being as large as a Thrush, and many as big as Sparrows; the upper plumage is generally striated like a Lark's in females and males out of breeding-plumage: the male as a rule undergoes a marked change of plumage at the breeding-season: the note is loud and harsh, and the disposition, although the birds are social in habit, savage and quarrelsome, little affection being manifested even between the sexes. The Whydahs cannot be separated from the true Weavers, as there is a complete gradation between the two groups.*

B. Posterior end of the culmen only slightly invading the forehead, so that the length from its hinder end to a point between the nostrils is less than the breadth of the bill there, and a line drawn between these forms the base of an approximately equilateral triangle. Munias, Waxbills, and Grassfinches *Spermestinæ.*

The birds of this group are all small, none equalling a common sparrow in size, though the biggest, the well-known Java Sparrow (*Munia oryzivora*) is nearly as large, and far bigger than many *Ploceinæ*; but few approach this bird in stature, and some are among the most minute of Passerine birds. They never display a lark-like striated plumage, nor does the plumage of the male undergo a change, except in the Avadavats (*Sporæginthus amandava* and *S. flavidiventris*). Their notes are low and often pleasant, and their disposition generally affectionate and caressing to a degree, even with birds of alien species. Egg always white.

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* Through *Penthetria, Penthetriopsis,* and *Urobrachya* on the one hand, *Vidua* and *Hypochera* on the other.

4. SOME EXPERIMENTS ON SEXUAL SELECTION IN THE AVADAVAT.

The affectionate and caressing disposition of the Munia group, above alluded to, suggested one of them as a fit subject for experiments in Sexual Selection, the direct evidence for which is as yet somewhat to seek. And as the Avadavat (*Sporæginthus amandava*) shows a marked sexual difference in colouration during the breeding-season and varies in the intensity of this nuptial decoration of the males, it seemed the best species to select, being also very easy to procure. Accordingly, having procured a three-compartment cage, and fitted it with two perches running through all three compartments, which were separated by wire netting, so that the birds could easily see each other and sit side by side, I made the following experiments with this species:—

No. I.

Placed in the cage on *August* 27*th*, three birds just bought, all from the same small cage in the Bazaar:—a hen (*a*), the only one in the lot from which these were taken; a bright coloured scarlet-red cock (A) well spotted with white, and a dull copper-red cock (B), deficient in spots on the breast. A lost some of his tail in handling.

August 28*th*. All birds well, but wild; both cocks trying to get in with hen; hen inclined to try and get in with cock A.

August 29*th*. A, which was not quite so active as B yesterday, looks very sick; hen nevertheless sometimes inclined to sit on his side of her compartment. Both cocks trying to get to her, and sitting much closer to the side than she does.

August 30*th*. A looking as well as before to-day; hen sitting mostly at his side of the cage, and the dung there proves she has roosted on that side against the wire.

August 31*st*. A still looking well, and hen markedly inclined to sit mostly his side; B not looking very well; one of them singing.

September 1*st*. A well, hen markedly inclined to sit by him; B looking very seedy. One bird still singing. (I think A in both cases). Hen has still roosted on his side (A's).

September 2*nd*. A well, hen definitely sitting by him: has evidently roosted that side all the time; B looking very seedy still.

September 3*rd*. A well, B dead; I think he has been sickly all along, as he is very thin; but as above noted, he was lively enough at first. He has had diarrhœa of late. He ate small millet readily enough, but I don't think took much of a larger seed I gave later, which the other eat all right. (I gave them subsequently small millet).

No. II.

September 3rd. Removed A (who I found was minus one hind claw, lost some time since) and replaced him and B by two birds procured from same dealer, from a cage containing cocks only. These did not differ so much as A and B, but one (C) was more scarlet and better spotted than the other (D) which was coppery in hue. Cleaned away dung from under hen's top perch, and put C in B's place, and D in A's, so that locality could make no odds. C is minus some of his tail, as A was.

September 4th. Hen, though she has evidently roosted next D, in the old place, showed a marked preference for C's side. She is hardly so well as usual, and has slight diarrhœa, D wants to get in with her. Both he and C look well. One was singing to-day.

September 5th. All birds well: one singing; hen mostly on side of C. I think she roosted next him last night.

September 6th. All birds well; heard D singing; the hen sits sometimes on his side, but I think, on the whole, more on C's, judging especially by the dung deposited.

September 7th. Hen sitting on both sides, most on C's in afternoon at all events. She sits very close to the wire now. Have had cage well cleaned.

September 8th. Hen still varying, but at evening sitting most by C. I doubt whether she roosted by him last night, however, though evidently keeping his side by day.

September 9th. Hen varying a little, but sitting mostly very close to C in morning. Heard C singing. Not observed in afternoon, being Saturday. Quite settled to C, I think.

September 10th. Hen sitting near D when I first saw her, settled near C as usual at noon. Removed her.

No. III.

September 11th. Replaced hen by another (β) a particularly fine big bird, got from same dealer, out of a cage containing hens only. Hen sat close to D at first, latterly to C.

September 12th. Hen distinctly favouring C, and often sitting near him; heard him sing once.

September 13th. Hen seen once or so sitting by D, but oftener by C; cage cleaned, and dung seems to show she has been more on D's side than C's to-day. Yet appearances as above stated.

September 14th. Hen has evidently roosted on C's side. Sitting mostly by D, to-day; heard him sing. Late, when she was sitting by D, C sang several times, and she went and sat by him a little while.

September 15th. Hen seems to have roosted by D: she has sat on the whole more by him to-day, as proved by dung and observation. Both cocks have been singing, about equally well. Had her cage cleaned.

September 16th. Hen apparently roosted close to C, and on the whole inclines to him to-day. I had her cage cleaned again to-day. Heard C sing when she was sitting by him.

September 18th. Made no observations yesterday, but cage was cleaned about midday, and dung showed plainly to-day hen had roosted by C; she had also sat much near D. Hen's cleaned again first thing after examination. Saw her sitting by D to-day, and dung seems to show she has sat there more; but at evening much inclining to sit by C.

September 19th. Dung showed hen had roosted by C, and though sitting more by D at first, in the afternoon and evening she was settled by C; D very anxious to get in with her, as he has *always* been; I have not seen C equally so.

September 20th. Was not quite sure from state of cage which side hen had roosted; had it cleaned, and found later she had sat both sides; a little more by D; in afternoon sitting by C, however, as usual. Caught both cocks, and let them in with her together.

D's tail much disarranged by his frequent attempts to get to her. There was no fight, however, and she seemed rather inclined to sit by D, so I released the lot.

It is obvious from these experiments that hen (a) preferred the brighter-coloured males, while no such certain conclusion can be come to in the case of (β) Possibly the superior brilliancy of C was compensated for by D's obvious eagerness. It should be remembered also that brilliant colour in many birds at all events is a sign of high condition and superior age, so that the problem to be dealt with is by no means a simple one. All I can claim to have shown in these few experiments is that the method of conducting them, suggested by Moseley (Naturalist on the Challenger, p. 373) is a perfectly feasible one, given a sufficiently demonstrative species varying in colouration. A more extensive series would no doubt result in a definite settlement of this most interesting question, and such can easily be made by any fancier of birds.

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Materials for a Carcinological Fauna of India. No. 5. The Brachyura Primigenia, or Dromiacea. By A. ALCOCK, M.B., C.M.Z.S., *Superintendent of the Indian Museum.*

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The opinions adopted in this paper are those of BOAS, that the *Dromiacea* are *Brachyura*; and of BOUVIER, that they connect the higher *Brachyura* with the Homarid family of *Macrura*.

I have endeavoured to show that the *Dromiacea*, or *Brachyura Primigenia*, include two natural groups—*Dromiidea* and *Homolidea*—each of which is a collection of families equivalent to the collections of families recognized as *Catometopa*, *Cyclometopa*, etc.; but, as is only to be expected in dealing with primitive groups, the families are small.

After raising a family to the rank of a tribe, and splitting it up into several independent families, it may seem inconsistent to unite the recognized genera of other authors, as is done in this paper with the genera *Dromia*, *Dromidia*, *Cryptodromia*, and *Petalomera*, all of which are treated as sub-genera of *Dromia*. But the reason for this treatment is that these are all linked together by intermediate forms.

The Indian species of Dromiacea number 28 and belong to the following genera and families:—

DROMIIDEA {
Homolodromidæ:—*Arachnodromia* (? = *Homolodromia*).
Dynomenidæ:—*Dynomene*, *Acanthodromia*.
Dromiidæ:—*Dromia* (*Dromidia*, *Cryptodromia*, *Petalomera*), *Pseudodromia*, *Conchoecetes*, *Sphaerodromia*.

HOMOLIDEA
Homolidæ:—*Homola* (*Paromola*, *Homolax*) *Paromolopsis*, *Hypsophrys*.
Latreillidæ:—*Latreillopsis*, *Latreillia*.

DROMIACEA or BRACHYURA PRIMIGENIA.

Anomoures Dromiens and *Homoliens*, (part) Milne Edwards, Hist Nat. Crust. II., pp. 168, 180.

Dromiacea, De Haan, Faun. Japon. Crust. p. 102.

Dromidea vel Anomoura Maiidica Superiora, Dana, U.S. Expl. Exp. Crust. pt. 1, p. 400.

Anomoura Dromidea, Miers, Cat. Crust. New Zealand, p. 57.

Dromiacea, J. E. V. Boas, Recherches sur les affinités des Crustacés décapodes, p. 202.

Anomoura Dromidea, Haswell, Cat. Austral. Crust. p. 138.

Anomura Dromidea, Henderson, Challenger Reports, Zoology, Vol. XXVI., p. 2.

Dromiacés (Etudes Comparatives des), Bouvier, Bull. Soc. Philomath. Paris, (8) VIII., 1896, pp. 34–108.

Dromiidea, Ortmann in Bronn's Thier Reich, V. ii., Arthropoda, p. 1153.

Carapace seldom broader than long, subquadrilateral or subovoid (sometimes sub-circular, or urn-shaped, or sub-pentagonal), often (as also the appendages) pilose. Front narrow.

Orbits and antennulary fossæ may either be altogether wanting, or there may be common orbito-antennulary fossæ into which the eyes and antennules are both retractile.

The antennal peduncle consists of four separate joints, and the antennal flagellum is long.

The epistome is triangular or truncate-triangular, and is well delimited from the palate.

The buccal cavern is quadrilateral, but is usually broader in front than behind. The external maxillipeds may be pediform, or sub-pediform, or completely opercular.

The last pair of legs are dorsal in position, and, with few exceptions, are prehensile slender and reduced in size, or even sometimes rudimentary. The penultimate pair sometimes resemble the last pair.

The abdomen in both sexes is large, and usually consists of seven separate segments: in the male it has the usual anterior two pairs of modified copulatory appendages: in the female it has the usual four pairs of ovigerous appendages and, in addition, a pair of smaller uniramous appendages situated on the first segment.

The genital ducts of the female open upon the bases of the 2nd pair of legs (third pereiopods): those of the male open on the bases of the fourth pair of legs (5th pereiopods).

The gills are usually phyllobranchiæ, but may be trichobranchiæ, or may be intermediate in character. The gill-plumes vary in number from 20 to 8 on either side.

I follow Professor Boas, without hesitation, in placing the *Dromiacea* at the base of the Brachyura; and I further think that no one who has access to a good spirit-collection of the two groups in question can read M. E.-L. Bouvier's clever paper, cited above, *Sur l'origine Homarienne des Crabes*, without accepting the opinion of the latter author—an opinion previously suggested, as the author states, by Huxley—that the *Dromiacea* are the directly-connecting link between the Crabs (*Brachyura vera*) and the *Homaridæ*.

The *Dromiacea* may be divided into two groups, which seem to me to have something more than family value, namely, the *Dromiidea* and the *Homolidea*, each of which has retained certain primitive characters while following its own line of evolution.

Tribe I. DROMIIDEA.

Dromiens, Milne Edwards, Hist. Nat. Crust. II. 168.

Dromidæ, Henderson, Challenger Anomura, p. 2.

Dromidæ et *Dynomenidæ*, Ortmann, in Bronn's Thier Reich, V. ii. Arthropoda, p. 1155.

Carapace sometimes longer than broad, often broader than long, without *linea anomurica*.

Eyes and antennules almost always (*Homolodromia* is the only exception) retractile into common orbito-antennulary pits, the lower wall of which is formed about equally (1) by the basal joint of the antennule itself, (2) by the basal joint of the antenna, and (3) by a sub-orbital spine or dentiform lobe.

These orbito-antennulary pits very often show traces of a subdivision into two fossæ, one for the antennule the other for the eye—the boundary between the two fossæ often being a tooth or a sort of fold in the upper margin of the "orbit."

Eye of the ordinary form, situated at the end of a short stout eye-stalk, the basal joint of the eye-stalk being inconspicuous.

Epistome triangular, its apex usually being in close contact with the deflexed tip of the front. Vault of the palate of good depth.

External maxillipeds usually opercular, sometimes subpediform.

Fingers of the chelipeds generally short, stout, channelled along their opposed surfaces, and strongly calcified in their distal half.

Sternum of the female traversed longitudinally, in part or in almost all of its extent, by a pair of special grooves that sometimes end in special tubercles.

The abdomen of both sexes consists of seven separate segments. Very often a pair of small lateral plates—the rudiments, probably, of the 6th pair of abdominal appendages—is intercalated between the 6th and 7th somites.

The gill-plumes vary in number from 20 to 14 on either side, and are either trichobranchiæ or phyllobranchiæ.

Many of the species are protected by a commensal Sponge or Ascidian, or by an empty valve of a Lamellibranch shell, carried over the back.

Tribe II. HOMOLIDEA.

Homoliens (part), Milne Edwards, Hist. Nat. Crust II. 180.

Homolidæ, Henderson, Challenger Anomura, p. 18: Ortmann in Bronn's Thier Reich, V. ii., Arthropoda, p. 1155.

Carapace longer than broad: *linea anomurica*, usually present.* The eyes are not retractile into orbits, nor the antennules into pits. Basal antennulary joint subglobular.

The eye-stalks each consist of two movable joints, a slender conspicuous basal joint which is sometimes of great length, and a stout terminal joint that carries the eye. The antennal flagella are, except in the *Latreillidæ*, much longer than the carapace.

The interantennulary septum is a distinct vertical process, and is not formed merely by the close apposition of the apex of the epistome to the front.

The front forms a slender triangular prominent rostrum which may be bifid at tip, and often has a spine on either side of its base.

The division between the epistome and palate is distinct, but the vault of the palate is shallow.

External maxillipeds pediform or sub-operculiform.

The chelipeds and legs are long and slender: the fingers are not channelled *en cuillère.* Only the last pair of legs is dorsal and reduced in size.

Sternum of the female broad, without any special longitudinal grooves.

The abdomen of the male, and usually but not always of the female also, consists of seven separate segments. There are no lateral platelets intercalated between the 6th and 7th segments.

The gills are phyllobranchiæ, and the gill-plumes vary in number from 14 to 8 on either side.

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* The *linea anomurica* is a curious suture-line running fore and aft on either side from the posterior border of the carapace to the inner side of the antennal spine. For its homologue among the nearer relatives of the Homolidea we have to go to certain species of *Peneus*.

In comparing the above synopses of characters it will be seen that the *Dromidea* as a whole have developed along Brachyurous lines in respect of the antennal flagella, orbits, external maxillipeds, and shape of the carapace, but have kept near to the primitive (Homarid) branchial arrangements. Whereas the *Homolidea* as a whole show a tendency to approach the higher Brachyura in the reduction of the branchiæ, but have not departed much from the primitive (Homarid) type in the form of the antennal flagella, external maxillipeds and very imperfect orbits.

Tribe I. DROMIIDEA.

The *Dromiidea* which, notwithstanding the more Brachyurous form of the carapace of their best known representatives, are as a whole more primitive than the *Homolidea* may be divided into three families—*Homolodromidæ*, *Dynomenidæ* and *Dromidæ*—characterized as follows:—

Family I. HOMOLODROMIDÆ.

Carapace longer than broad, convex in both directions, the true cervical and the branchial grooves both present.

Front cut into two prominent teeth, between which, but on a much lower plane, a third small tooth is *sometimes* present.

Antennal flagella longer than the carapace.

External maxillipeds with a marked pediform cast.

Chelipeds equal, slender, though stouter than the legs.

First two pair of legs much longer than the chelipeds: last two pair much shorter than the first two pair, subdorsal, prehensile.

The abdomen in both sexes consists of 7 separate segments: there are no lateral platelets intercalated between the 6th and 7th segments.

The gills are trichobranchiæ, or are intermediate between trichobranchiæ and phyllobranchiæ: the gill-plumes are very numerous—there may be as many as 20 on either side.

Epipodites are present on the chelipeds and first two or three pairs of legs.

The sternal grooves of the female are short, ending at the level of the genital openings.

To this family belong the following genera:—

1. *Homolodromia*, A. Milne Edwards, Bull. Mus. Comp. Zool., VIII. 1880, p. 33: Recueil de Fig. de Crustacés Nouveaux, pl. 39, fig. 2.
2. *Dicranodromia*, A. Milne Edwards, Bull. Mus. Comp. Zool., VIII. 1880, p. 31: Recueil de Fig. de Crust. Nouv. pl. 10.
3. *Arachnodromia, Alcock, *seq*.

Family II. DYNOMENIDÆ, Ortmann.

Dynomenidæ, Ortmann in Bronn's Thier Reich, V. ii., Arthropoda, p. 1155.

Carapace variable, either longer than broad and convex, or broader than long and flattish. Branchial groove usually present, cervical groove sometimes present.

Front broadly triangular, sometimes notched at tip. Antennal flagella not so long as the carapace.

External maxillipeds typically opercular, completely closing the buccal cavern.

Chelipeds equal or slightly unequal, generally much stouter than the legs.

First three pair of legs stout, about as long as the chelipeds. Fourth (last) pair of legs dorsal and rudimentary.

The abdomen in both sexes consists of 7 segments, and there is a pair of lateral platelets intercalated between the last two segments.

The gills are phyllobranchiæ but sometimes show the transition from tricho- to phyllobranchiæ. The gill-plumes are 16 (?) on either side.

Epipodites are present on the chelipeds and first three pair of legs.

Sternal grooves of the female ending at the level of the genital openings.

To this family belong (1) Dynomene and (2) Acanthodromia, both of which are represented in Indian Seas.

Family III. DROMIIDÆ, *restr.*

Carapace variable, sometimes as long as or even a little longer than broad, sometimes slightly broader than long; generally strongly convex in both directions, sometimes flat; commonly ovoid or subcircular, occasionally pentagonal.

[*] Branchial groove almost always conspicuous, the true cervical groove present or absent on the dorsum of the carapace.

Front usually cut into 3 teeth, the middle one of which is always on a much lower plane than the others and is often of insignificant size or even absent: the front is rarely triangular, without lateral teeth. Antennal flagella shorter than the carapace.

External maxillipeds typically opercular, completely closing the buccal cavern.

Chelipeds equal, generally much stouter than the legs.

First two pair of legs generally stout, not much shorter than the chelipeds.

Last two pair of legs generally much reduced in length and slender, subdorsal and prehensile. There is a tendency for the fourth (last) pair to be a little longer than the third pair, and occasionally the fourth pair are as long as either of the first two pair.

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[*] The branchial groove of Bouvier, which by most authors is called the "cervical" groove.

The abdomen in both sexes consists of 7 segments, and there is a pair of lateral platelets intercalated between the last two segments.

The gills are phyllobranchiæ and are 14 in number on either side.†

An epipodite of small size is present on the chelipeds but not on any of the legs.†

The sternal grooves of the female are variable: they may end at the level of the genital openings, or at the bases of the first pair of legs, or at the bases of the chelipeds.

To this Family the following genera belong:—

1. *Dromia, Fabr.: *seq.*
2. *Dromidia, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 225 (subgenus of *Dromia*).
3. *Cryptodromia, Stimpson: *seq.* (subgenus of *Dromia*).
4. *Petalomera, Stimpson: *seq.* (subgenus of *Dromia*).
5. *Pseudodromia, Stimpson: *seq.* (? subgenus of *Dromia*).
6. *Eudromia*, Henderson, Challenger Anomura, p. 13.
7. ???*Ascidiophilus*, Richters, in Mobius, Meeresf. Maurit. p. 158 (it is very doubtful whether this form really belongs to the Dromiacea).
8. *Conchoecetes, Stimpson: *seq.*
9. *Hypochoncha*, Guérin, Rev. et Magasin de Zool. (2) VI. 1854, p. 333.
10. *Sphærodromia, Alcock, *seq.*

Tribe II. HOMOLIDEA.

The *Homolidea* may be divided into two families *Homolidæ* and *Latreillidæ.*

To the Homolidæ belong (1) *Homola* (with subgenera *Homolax* and *Paromola*), (2) *Paromolopsis* and (3) *Hypsophrys*, all of which are represented in Indian Seas.

To the Latreillidæ belong (1) *Latreillia* and (2) *Latreillopsis*, both of which are found in Indian Seas.

I am uncertain of the position of *Homologenus* A. Milne Edwards, which, but for its singular branchial formula, would be placed with the *Homolidæ*. It may perhaps have to be separated as a distinct subfamily of the *Homolidæ*. The references to the literature of this genus are: Bull. Mus. Comp. Zool. VIII., 1880, p. 34, (*Homolopsis* name pre-occupied): Challenger Anomura, p. 20: Bull. Soc. Philom., Paris, (8) VIII., 1896, p. 63: Bronn's Thier Reich V. ii., Arthropoda, p. 1156.

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† Huxley (P. Z. S. 1878, p. 785) gave, as the sum of the branchial formula of *Dromia*, gills 16 + 1 epipodite. Milne Edwards (Hist. Nat. Crust. II. 172) stated that the gills are 14 in number on either side. I have examined *Dromia Rumphii* and *D. ciliata*, *Cryptodromia lateralis*, *Petalomera granulata* and *Conchoecetes artificiosus*, in all of which I find 14 branchiæ and 4 epipodites on either side: of the epipodites, 3 belong to the maxillipeds, and one—a small one—to the chelipeds.

Family I. HOMOLIDÆ *restr.*

Carapace elongate-quadrangular, or ovoid, or urn-shaped.

Terminal joint of the eyestalk (with the eye) either longer or shorter than the slender basal joint. Antennal flagella much longer than the carapace.

External maxillipeds pediform or subpediform.

The gill-plumes are 14 in number on either side, and there are epipodites to the chelipeds and first two pair of legs.

Homola, Paromolopsis and Hypsophrys, *vid. seq.*

Family II. LATREILLIDAE.

Carapace elongate-quadrangular, or piriform.

Basal joint of eye-stalk very much longer than the terminal joint.

Antennal flagella not so long as the carapace.

External maxillipeds sub-operculiform.

The gill-plumes are 8 in number on either side and there are no epipodites to the chelipeds or legs.

Latreillia and Latreillopsis, *vid. seq.*

Tribe DROMIIDEA.

Family HOMOLODROMIDÆ.

ARACHNODROMIA, Alcock.

Arachnodromia, Alcock, Investigator Deep Sea Brachyura, p. 17.

Carapace elongate-oblong but somewhat broader behind than in front, deep, inflated, tomentose, its texture thin but well calcified: two creases break either lateral border, the posterior one being the more distinct and being continued to the cardiac region (=branchial groove), the anterior one, or true cervical groove, not proceeding far on to the dorsum of the carapace.

The front is horizontal, prominent, and deeply bifid.

The antennule and eye of either side are completely retractile into a common deep fossa (just as in *Dromia*) which affords them complete protection. As in *Dromia*, the floor of this common antennular-orbital fossa is formed by a subocular ("antennal") tooth in contact with the basal joint of the antenna, and, as in *Dromia*, the outer wall of the orbit is breached by a wide gap. The orbital portion of the fossa, which is loosely filled by the eyes, has the hollow for the eyes much deeper than the hollow for the eyestalk. The eyestalks are long and slender, the eyes small but perfectly formed and well pigmented.

The two basal joints of the antennæ, which are quite freely movable, largely fill the gap in the lower wall of the orbit, and lie in the same plane with the antennules; the second joint has its antero-external angle produced to form a coarsish spine: the antennal flagella are longer than the carapace.

The palate is particularly well demarcated from the epistome and is rather broader in front than behind: the ridges that define the expiratory canals are very distinct. The epistome is in the closest possible contact with the front, but without complete fusion. The external maxillipeds are distinctly operculiform, but owing to the moderate expansion of the merus and to the coarseness of the palp, they have a slight pediform cast: they close the buccal cavern, but not so tightly as in *Dromia*.

The chelipeds are equal and are rather slender, though considerably stouter than the legs: the fingers are well calcified and are hollowed *en cuillère*, the tip of the dactylus shuts into a notch in the tip of the opposed finger.

The legs are cylindrical: the first two pairs are very long, the last two are short, subdorsal in position, and cheliform rather than subcheliform.

The sternal grooves of the female end opposite the openings of the oviducts, without tubercles.

The abdomen of both sexes consists of seven distinct segments. In both sexes the pleuræ of the 3rd–6th abdominal somites are remarkably free and independent (*i.e.* not in contact with those in front and behind) and the last abdominal tergum is nearly as long as the preceding five combined. In the male this last tergum is marked in a way that suggests its formation out of a segment fused with a pair of appendages.

This crustacean, as I have previously remarked, so closely resembles the *Homolodromia* described and figured by Milne Edwards* and referred to by Bouvier,† that at first sight it might be supposed to be the same form.

In *Homolodromia*, however, it is distinctly stated that the antennules are not retractile, and that there are no special orbits.

In *Arachnodromia*, on the other hand, there are orbits formed on exactly the same plan as, and hardly less perfect than, those of *Dromia*, and they afford complete protection to the retracted eyes and antennules, the antennulary flagella folding, as in *Dromia*, behind the eyes.

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* A. Milne Edwards, Bull. Mus. Comp. Zool. Vol. VIII. 1880, p. 32, and Recueil de figures de Crustacés Nouveaux etc. pl. 39, fig. 2. Not the Homalodromia of Miers, which ought to be placed with *Pseudodromia*.

† E. L. Bouvier, Bull. Soc. Philom. Paris (8) VIII. 1895–96, p. 37, *et seq.*

The branchial formula is as follows :—

Somites and their appendages.	Podobranchiæ.	Arthrobranchiæ.	Pleurobranchiæ.	
VII. ...	0 ep.	0	0	= ep.
VIII. ...	1 + ep.	1	0	= 2 + ep.
IX. ...	1 + ep.	2	0	= 3 + ep.
X. ...	1 + ep.	2	0	= 3 + ep.
XI. ...	1 + ep.	2	1	= 4 + ep.
XII. ...	1 + ep.	2	1	= 4 + ep.
XIII. ...	0	2	1	= 3
XIV. ...	0	0	1	= 1
	5 + 6 ep.	11	4	20 + 6 ep.

The formula is thus the same as that given by Bouvier for *Homolodromia*.

1. *Arachnodromia Baffini*, Alcock and Anderson.

Arachnodromia Baffini, Alcock and Anderson, Ann. Mag. Nat. Hist., Jan. 1899, p. 7: Alcock, Investigator Deep Sea Brachyura, p. 19, pl. ii. fig. 1.

Carapace square-cut, dorsally convex, very distinctly (from a fourth to a fifth) longer than broad, its greatest breadth being just in front of the posterior border, its greatest depth approximating its greatest breadth, its surface—like that of the appendages and other parts of the body—tomentose. Except for a few small sharp granules anteriorly and laterally and along the lateral border, the carapace is unarmed.

The front is deeply cleft to its base, and has the form of two acutely triangular teeth.

Upper margin of orbit notched near its outer angle which is dentiform, the outer angle of the lower margin of the orbit is much more strongly dentiform, and the (outer) orbital wall between the two spines is deficient.

Antennal flagella longer than the carapace.

Chelipeds rather slender, unarmed except for a few granules seen on denudation, about $1\frac{2}{3}$ times the length of the carapace : fingers strongly hollowed '*en cuillère*,' especially the immovable one, which alone has teeth : wrist not elongate.

First two pairs of legs more than twice the length of the carapace : their dactyli are about two-thirds the length of the preceding joint, are stout, are sharply spinate along the posterior edge, and end in a claw. The last two pairs of legs are about the same length as the carapace : their small claw-like dactyli shut down on a ring of spines at the end of the preceding joint.

Colours: dirty whitish, with a bluish tinge on the carapace and a faint reddish tinge elsewhere; eyes chocolate.

Two males and a female, from off the Travancore coast, 430 fms.: a small male from the Andamans, 238–290 fms.

The carapace of the largest male is 20 millim. long and 15 millim. broad, that of the female is 30 millim. long and 24 millim. broad.

Named in memory of the great Arctic explorer William Baffin, who, according to Sir Clements Markham, was the first Englishman to actually plot charts in these Seas.

Family DYNOMENIDÆ.

This family includes two genera which may be thus diagnosed:—

I. Carapace flattish, broader than long, covered with hairs .... DYNOMENE.
II. Carapace convex, longer than broad, covered with spines or spinules......... ACANTHODROMIA.

DYNOMENE, Latreille.

Dynomene, Latreille in Cuvier's Règne An. (nouv. ed. 1829) p. 69: Desmarest, Consid. Gen. Crust. p. 133: Milne Edwards, Hist. Nat. Crust. II., 179: Lamarck, Hist. Nat. Anim. sans Vert. (2nd ed.) p. 482: De Haan, Faun. Japon. Crust. p. 104: Dana, U. S. Expl. Exp. Crust. pt. I. p. 402: A. Milne Edwards, Ann. Sci. Nat. Zool., (6) VIII. 1879, Art. 3: Ortmann in Bronn's Thier Reich, V. ii., Arthropoda, p. 1155.

All parts usually tomentose.

Carapace subcircular, flattish, broader than long.

Front broadly triangular, dorsally grooved, more or less distinctly notched or divided at tip.

Palate well delimited from epistome: efferent branchial channels well defined.

The chelipeds usually do not differ greatly in size from the first 3 pair of legs: these are stout and of about equal length.

The 4th (last) pair of legs are quite rudimentary and alone are dorsal in position.

As regards the branchial formula, according to Bouvier it follows the *Dicranodromia* and *Homolodromia* type.*

Distribution: Tropical Indo-Pacific, from Madagascar to California.

2. *Dynomene pilumnoides*, n. sp.

The carapace and appendages are covered with an exceedingly thick tomentum of club-shaped hairs, the chelipeds and legs are also thickly fringed with additional longer hairs. The hairs completely conceal all the texture and sculpture beneath them.

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* The material at my disposal, at present, does not permit me to indulge in dissection; but I have been able to make out that the branchial plumes and epipodites are more numerous than they are in *Dromia*, *Cryptodromia*, &c.

Carapace subcircular, slightly broader than long, flattish. The true cervical groove is well defined, but the branchial groove is hardly distinguishable.

There are a few very inconspicuous symmetrically-disposed elevations on the gastric and on the anterior part of the branchial regions.

Front broadly-triangular, deeply grooved in the middle line. Upper border of orbit oblique, with a fold or notch (best visible from inside the orbit) marking the equivalent of the inner supra-orbital angle of the higher Brachyura. Outer orbital angle not dentiform. Suborbital lobe neither dentiform nor prominent.

Lateral borders of carapace with 5 spine-like teeth, the last of which is much the smallest and stands at the branchial groove.

Chelipeds in the male a little unequal, the smaller one not stouter and not quite so long as, the larger one a little stouter and about as long as, the first 3 pair of legs.

When the chelipeds and legs are denuded their surface is smooth and unsculptured, except that the posterior border of the dactyli of the legs is serrated.

The fourth (last) pair of legs are small slender rudiments, not a fourth the length of the 3rd pair.

A single male from off the Laccadives, 50 to 30 fathoms. Its carapace is 10 millim. long and a little over 11 millim. broad.

The smoothness of the carapace, chelipeds, and legs, and the inequality of the chelipeds distinguish this species from *D. hispida*, of which, however, it may prove to be only a variety.

ACANTHODROMIA, A. Milne Edwards.

Acanthodromia, A. Milne Edwards, Bull. Mus. Comp. Zool., VIII. 1880, p. 31: E. L. Bouvier, Bull. Soc. Philomath. Paris, (8) VIII. 1895-96, pp. 56, 57: Ortmann in Bronn's Thier Reich, V. ii., Arthropoda, p. 1155.

Differs from *Dynomene* in having the carapace longer than broad, convex, and closely covered with spines instead of hairs.

Distribution: Caribbean Sea, Andaman Sea.

3. *Acanthodromia margarita*, Alcock.

Dynomene margarita, Alcock, Investigator Deep-Sea Brachyura, p. 19, pl. ii. fig. 3.

The whole carapace and dorsal surfaces of the chelipeds and legs are as closely as possible covered with spines and spinules: the under surfaces of the body and legs, the eye-stalks, antennæ, and external maxillipeds are closely and crisply granular.

On the middle of the fourth abdominal tergum is a pair of large smooth tubercles, exactly like pearls, in the closest contact with one another.

Carapace sub-cylindrical, longer than broad; the regions hardly indicated, though the branchial groove is fairly plain.

Front triangular, deflexed, dorsally concave; its apex is in close contact with that of the epistome, and is surmounted by a horizontal spine similar to the larger spines of the surface of the carapace. Supra-orbital borders tumid.

Antennal flagellum nearly as long as the carapace.

Chelipeds equal, a little longer and stouter than the first three pair of legs, and not much longer than the carapace. The fingers are short and stout, and meet throughout their extent.

The last pair of legs are slender rudiments, hardly longer than the basal joints of the other legs.

Colours in spirit, milk-white; eyes deeply pigmented.

A single small male from the Andaman Sea, 75 fathoms. The length of its carapace is 5 millim.

Family III. DROMIIDÆ.

Key to the Indian Genera and Sub-genera of Dromiidæ.

I. Front much as in *Dynomene*, broadly triangular, dorsally grooved, notched at tip. The sternal grooves of the female do not quite reach to the level of the genital openings on the 2nd pair of legs (third pereiopods) ... SPHÆRODROMIA.

II. Front usually cut into 3, sometimes into 2, teeth, rarely entire and triangular. The sternal grooves of the female reach at least as far as the level of the bases of the 1st pair of legs (2nd pereiopods):—

  1. Third pair of legs, though shorter, not less stout than the first two pair; ending in a huge talon-like dactylus: fourth (last) pair of legs short and very slender. Carapace flat and pentagonal ... CONCHOECETES.

  2. Third pair of legs similar to, though sometimes shorter than, the fourth (last) pair. Carapace usually convex:—

    i. Fourth (last) pair of legs shorter than the first two pair:—

      a. Legs smooth, the meropodites not specially dilated ... ... DROMIA & DROMIDIA.

      b. Legs nodular, the meropodites not specially dilated ... ... CRYPTODROMIA.

      c. Legs nodular; the meropodites of the chelipeds and first or first two pair of legs dilated, petal-like ... ... PETALOMERA.

ii. Fourth (last) pair of legs at least as long as
either of the first two pair ... ... PSEUDODROMIA.

Sphærodromia and *Conchoecetes*, and doubtfully also *Pseudodromia*, are to be looked upon as distinct genera. But there are undoubtedly forms that are transitional between *Dromia* and *Dromidia*, *Dromia* and *Cryptodromia*, and *Cryptodromia* and *Petalomera*, and even between *Dromia* and *Pseudodromia*, so that these ought not, in a natural system, to be separated, though for convenience they may stand as subgenera.

DROMIA, Fabr.

Dromia, Fabricius, Ent. Syst. Suppl. p. 359: Latreille, Hist. Nat. Crust. &c., V. p. 383, and Nouv. Dict. Hist. Nat. IX. p. 583: Leach, Malac. Pod. Britt. Text of pl. xxiv A: Risso, Hist. Nat. Crust. Nice, p. 15, and Hist. Nat. Europ. Mérid. V. p. 32: Desmarest, Consid. Gen. Crust. p. 136: Milne Edwards, Hist. Nat. Crust. II. p. 170: Lamarck, Hist. Nat. Anim. sans Verteb. (2nd ed. 1838) V. p. 480: De Haan, Faun. Japon. Crust. p. 104: Dana, U. S. Expl. Expd. Crust. pt. I. p. 402: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 226: Henderson, Challenger Anomura, p. 3: Ortmann in Bronn's Thier-Reich, V. ii. Arthropoda, p. 1155.

All parts except the tips of the fingers and of the dactyli are, generally, tomentose.

Carapace not elongate in the adult, strongly convex or subglobose.

Front cut into three teeth, of which the middle one is on a lower plane than the others and is often so much smaller than them and so much deflexed as to be hardly visible from a dorsal view.

Palate well delimited from the epistome: efferent branchial channels well defined, but not always bounded by distinct and unbroken ridges.

The chelipeds may have some of the joints nodose, but the legs are smooth.

None of the legs have the merus dilated. The last two pair of legs are distinctly subcheliform, the spine at the end of the propodite against which the dactylus closes being well developed.

The sternal grooves of the female do not meet, and they end on the 2nd segment of the sternum, between the 2nd pereiopods.

The branchial formula is as follows:—

Somites and their appendages.	Podobranchiæ.	Arthrobranchiæ.		Pleurobranchiæ.		
		Anterior.	Posterior.			
VII. ...	ep.	0	0	0	=	0 ep.
VIII. ...	1 + ep.	0	0	0	=	1 + ep.
IX. ...	0 ep.	1	1	0	=	2 + ep.
X. ...	0 ep.	1	1	0	=	2 + ep.
XI. ...	0	1	1 (small)	1	=	3
XII. ...	0	1	1 (small)	1	=	3
XIII. ...	0	1	0	1	=	2
XIV. ...	0	0	0	1	=	1
Total ...	1 + 4 ep.	5	4	4		14 + 4 ep.

Key to the Indian species of the genus Dromia.

I. Carapace, in the adult, broader than long: front cut into 3 teeth of nearly equal size, of which the middle one is slightly the most prominent: third (penultimate) pair of legs hardly shorter than the fourth (last); no large spine at the far end of the *posterior* border of the propodite of the fourth (last) pair *D. rumphii.*

II. Carapace, in the adult, at least as long as broad: front cut into 3 teeth, of which the middle one is so small and so much deflexed as to be almost invisible in a dorsal view: third pair of legs very markedly shorter than the fourth; a spine at the far end of the posterior border of the propodite of the fourth (last) pair quite as long as that at the same end of the anterior border :—

1. True antero-lateral border of the carapace with 3 or 4 spines ... ... *D. cranioides.*
2. True antero-lateral border of the carapace entire ... *D. unidentata.*

4. *Dromia Rumphii*, Fabr.

Cancer lanosus, Rumph, Amboin. Rariteitk. p. 19. pl. xi. fig. 1: Seba, Thesaurus, III. pl. xviii. fig. 1.

Dromia Rumphii, Fabricius, Ent. Syst. Suppl. p. 360: Milne Edwards, Hist. Nat. Crust. II. 174: De Haan, Faun. Japon. Crust. p. 107, pl. xxxii: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 240: Tozzetti, "Magenta" Crust., p. 207: Hilgendorf MB. Ak. Berl. 1878, p. 812: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 370: Walker, Journ. Linn. Soc. Zool., XX. 1886-1890, p. 111: Ortmann, Zool. Jahrb. Syst. &c., VI. 1892, p. 548: J. R. Henderson, Trans. Linn. Soc., Zool, (2) V. 1893, p. 406.

All parts, except the tips of the fingers and dactyli thickly covered with a harsh tomentum, with sometimes scattered tufts of longer hair on the carapace.

Carapace in adults broader than long, strongly convex, smooth; the cardiac region and the branchial or "cervical" groove on either side of it plainly marked, the gastric region faintly indicated.

Front cut into 3 nearly horizontal teeth of nearly equal size, the middle one on a lower plane and slightly the most prominent.

In young specimens a projection of the upper edge of the "orbit" marks the position of the true inner supra-orbital angle of the higher Brachyura, but in large specimens this is obsolete.

The true antero-lateral borders of the carapace are cut into 3 sharp but coarsish spines, the 2nd of which often has a small secondary denticle at its base. In addition there is a spine on the summit of the infra-orbital lobule, and another at the outer angle of the buccal cavern.

The postero-lateral borders are convergent and have one large coarse spine, placed immediately behind the cervical groove.

The borders of the arm are dentate, especially the upper border, and there are 2 or 3 teeth at the distal end of the upper border of the wrist and also along the upper border of the hand: all these dentations tend to disappear with age, but two tubercles at the distal end of the outer surface of the wrist are persistent.

The last two pair of legs are about equal in length, being hardly half as long as either of the first two pair: their propodites are much shortened and their dactyli are claw-like, forming chelæ with the opposing spines at the end of the propodites.

Abdomen of male with a broad convex ridge down the middle line.

Sternal tubercles of female very prominent.

In the Indian Museum are specimens from the Persian Gulf, Malabar coast (28 to 49 fms.), Ceylon, Coromandel coast, Orissa coast (25 fms.) and Gulf of Martaban (67 fms.)—also 2 from Mauritius.

The largest specimen, from Mauritius, is 5¾ inches across the carapace.

Distribution: Indo-Pacific Seas from the Red Sea, Mozambique, and Mauritius, to Japan.

5. *Dromia cranioides*, de Man.

Dromidia cranioides, de Man, Journ. Linn. Soc. Zool., XXII., 1887-88, p. 208, pl. xiv. figs. 6–8.

Carapace etc. tomentose. Carapace globose, a little longer than broad, perfectly smooth except for the "cervical" groove and for two small faint elevations side by side just behind the front.

Front cut into 3 teeth, the middle one of which is so small and on a plane so much lower than the others that it is hardly seen in a dorsal view.

A strongly marked acuminate tooth near the middle of the upper border of the orbit is equivalent to the inner supra-orbital angle of higher Brachyura. Sub-orbital lobe dentiform, very prominent. Outer orbital angle well defined, dentiform.

True antero-lateral borders of the carapace cut into 3 or 4 teeth; when 4, it is by intercalation of a little tooth close to the base of the 1st. A tooth, but not a strongly pronounced one, at the outer angle of the buccal cavern.

Postero-lateral borders slightly convergent, with one tooth placed immediately behind the branchial or "cervical" groove.

Borders of arm granular or obtusely denticulate, as also are the upper border of the wrist and of the hand: two tubercles at the distal end of the outer surface of the wrist.

The last two pair of legs have a claw-like dactylus which meets, in a cheliform manner, a spine at the end of the corresponding propodite.

The last pair are much longer than the last pair but one, being, in fact, very little shorter than either of the first two pair.

Abdomen as in *D. Rumphii.*

The sternal grooves of the female approach one another closely, but do not actually meet, on the 2nd segment of the sternum, near the anterior end of which they terminate, without tubercles.

In the Indian Museum are 5 females and 2 males, from the Andamans and Mergui.

The length of the carapace of the largest specimen is 28 millim.

This species may perhaps turn out to be identical with *Dromia indica* Gray (Zool. Miscell., p. 40).

6. *Dromia unidentata*, Rüppell.

Dromia unidentata, Ruppell, 24 Krabben roth. Meer., p. 16, pl. iv. fig. 2, pl. vi. fig. 9: Milne Edwards, Hist. Nat. Crust. II. 178: A Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 72: Hilgendorf, MB. Ak. Berl. 1878, p. 813: Müller, Verh. Nat. Ges. Basel. VIII. 1886, p. 472.

Dromidia unidentata, Kossmann, Reise roth. Meer. Crust. p. 67: de Man, Journ. Linn. Soc. Zool. XXII. 1887-88, p. 207, pl. xiv. figs. 4-5: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 255: Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 405: Ortmann, in Semon's Zool. Forschungsr. (Jena. Denkschr. VIII) Crust. p. 34.

Carapace etc. densely tomentose. Carapace about as long as broad, strongly convex, with some dimples when denuded, two of which, separating the post-gastric from the branchial regions, are specially conspicuous. "Cervical" groove well marked.

Front cut into two broadish but sharp teeth, between which, but on a very much lower plane, is an extremely inconspicuous denticle.

A broad tooth ("internal supra-orbital angle") near the middle of the upper border of the orbit. Outer orbital angle prominent but not dentiform. Suborbital lobe bluntly dentiform, but not prominent.

Antero-lateral borders entire, rather sharp. A slight projection, hardly amounting to a tooth, on the postero-lateral border, immediately behind the branchial or "cervical" groove.

Chelipeds smooth, except for two tubercles at the far end of the outer surface of the wrist.

The fourth (last) pair of legs are not so very much shorter than either of the first two pair and are very much longer than the 3rd pair. The propodites of the last two pair are much broader than long and are very spiny, one of the spines in the case of the last pair being as least as long as the spine against which the claw-like dactylus closes—so much so, that the last pair of legs appear to end in 3 claw-like spines the middle one being the dactylus.

The abdomen of the male, when denuded, has a broad convex ridge down the middle line; but when not denuded, the terminal segments of the male abdomen form with the basal joints of the chelipeds and first two pair of legs a remarkably flat surface, owing to the abrupt angular bending up of the last three abdominal segments.

The sternal grooves of the female approach one another closely, but do not actually meet, on the second segment of the sternum, near the anterior end of which they terminate, but without tubercles.

In the Indian Museum are 4 males and an egg-laden female, from Mergui, Port Blair, and the Persian Gulf.

The carapace of the largest specimen is 24 millim. long.

In one of the male specimens, in which the vasa deferentia are, as usual, wonderfully prominent, there are also openings in the basal joints of the 2nd pair of legs (3rd pereiopods) corresponding with the genital openings of the female.

Distribution: Red Sea and East coast of Africa, Persian Gulf, Ceylon, Coromandel coast, Andaman Sea, Malay Archipelago.

Subgenus Dromidia, Stimpson.

Dromidia, Stimpson, Proc. Ac. Nat. Sci. Philad., 1858, p. 225: Henderson, Challenger Anomura, p 12: Ortmann in Bronn's Thier Reich, V. ii. Arthropoda, p. 1155.

Dromidia is stated to differ from *Dromia* in having (1) the efferent branchial channels defined each by a distinct ridge, and (2) the sternal grooves of the female produced to, and approximated together on, the segment bearing the chelipeds.

Neither of these characters is sufficiently definite to be of generic value, and I do not think that they are enough to justify even subgeneric recognition.

Henderson (Trans. Linn. Soc., Zool. (2) V. 1893, p. 406) includes *Dromia (Dromidia) australiensis* Haswell in the Indian Fauna, basing his identification on de Man's figure (Archiv. für Naturges. LIII. 1887, i. pl. xvii. fig. 6.) But as that figure does not seem to me to correspond unequivocally with Haswell's description (Proc. Linn. Soc., N. S. Wales, VI. 1882, p. 755, and Cat. Austral. Crust. p. 139), it is sufficient for present proposes to quote these references.

Subgenus Cryptodromia, Stimpson.

Cryptodromia, Stimpson, Proc. Ac. Nat. Sci. Philad., 1858, p. 225: Miers, Cat. Crust. New Zealand, p. 57: Haswell, Cat. Austral. Crust., p. 138: Henderson, Challenger Anomura, p. 5: Ortmann in Bronn's Thier Reich, V. ii. Arthropoda, p. 1155.

Epidromia, Kossmann, Reise roth-Meer., Crust., p 69.

Differs from *Dromia* only in the following particulars :—

The tomentum when present is much shorter and more velvet-like. The legs, or at least the first two pairs of them, are nodular, as well as the chelipeds. According to Bouvier and Ortmann the chelipeds are without an epipodite ; but in *C. lateralis* this is not the case, and a small epipodite is present. The ridges that define the efferent branchial channels are distinct and unbroken.

The species are all small.

Key to the Indian species of Cryptodromia.

- I. Carapace smooth (non-granular) :—
  - 1. No spines on *dorsal surface* of carapace :—
    - i. Front cut into 3 teeth, all of which are plainly visible in a dorsal view : antero-lateral borders of carapace with more than one tooth : legs nodular :—
      - *a.* Antero-lateral borders with 3 teeth (not including the outer orbital angle and some teeth on the subhepatic region) ... ... *C. tuberculata.*
      - *b.* Antero-lateral borders with 2 teeth (not including the outer orbital angle, *etc.*) :—
        - *α.* Regions of carapace well defined : no tubercle on the surface of the maxillipeds... ... *C. canaliculata.*
        - *β.* A pearl-like tubercle in the middle of the exposed surface of the merus of the external maxillipeds ... ... *C. bullifera.*
    - ii. Front cut into 3 teeth, the middle one of which is hardly seen in a dorsal view : antero-lateral borders of carapace with a single tooth, at their anterior end : legs hardly nodular ... ... *C. hilgendorfii.*
  - 2. A dorsal spine on the hepatic region of the carapace, just behind the outer orbital angle ... ... *C. de Manii*
- II. Carapace (and appendages also) profusely granular : the regions of the carapace well defined and areolated :—
  - 1. Carapace subcircular in outline, its antero-lateral borders entire ... ... *C. ebalioides.*
  - 2. Carapace pentagonal in outline, its antero-lateral borders dentate ... ... *C. Gilesii.*

7. *Dromia* (*Cryptodromia*) *tuberculata*, Stimpson.

Cryptodromia tuberculata, Stimpson, Proc. Ac. Nat. Sci., Philad. 1858, p. 239 : de Man, Archiv. f. Naturges. LIII. 1887, i. p. 401.

Var. *pileifera*, nov.

Carapace etc. covered with a short scurfy tomentum which does not conceal the underlying texture.

Carapace broader than long, convex, smooth, without distinction of regions: the cervical groove broad, shallow.

Front cut into 3 broad triangular teeth of about equal size, the middle one of which is on a lower plane than the others and is deflexed.

A sharp tooth near the middle of the upper border of the orbit marks the true inner supra-orbital angle. Outer orbital angle dentiform. Suborbital lobe dentiform and very prominent.

True antero-lateral border cut into 3 or 4 blunt teeth: in the gap between the 1st tooth and the outer orbital angle two subhepatic teeth—one of which is large—show up and, from a dorsal view, look as if they belonged to the antero-lateral border: there are two similar teeth, one alone of which is conspicuous, at the outer angle of the buccal cavern.

On the postero-lateral border, at the branchial or "cervical" groove, is a denticle.

Wrist and palm, and corresponding joints of first two pair of legs, sharply and profusely nodular or tubercular on the outer surface: fingers compressed.

The third pair of legs, though much slenderer and less nodular than the first two pair and only about half their length, are fashioned on much the same plan, except that the propodite is much shortened: the spinule at the end of the propodite of this pair is not big enough to form a chela with the claw-like dactylus.

Last (4th) pair of legs slender and smooth, hardly a dactylus length shorter than the 2nd pair: their propodite has spines at the end of both borders, the spine at the end of the anterior border being large enough to form a chela with the dactylus.

Abdomen of the male slightly convex along the middle line, the 4th and 5th terga with some little nodules: in the female the 3rd–5th terga have the surface a little uneven, but not distinctly nodular.

Every specimen has a commensal sponge which covers it completely like a cap.

In the Indian Museum are 70 specimens from the Andaman reefs.

The carapace of a large egg-laden female is 9 millim. long and 11 millim. broad.

8. ? *Dromia (Cryptodromia) canaliculata*, Stimpson.

? *Cryptodromia canaliculata*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 240: de Man, Archiv. f. Naturges. LIII. 1887, i. p. 402 (*et synon.*): Ortmann, Zool. Jahrb., Syst. etc. VI. 1892, p. 545.

Dromia tomentosa, Heller, SB. Ak. Wien, XLIV. 1861, p. 241: *Cryptodromia tomentosa*, Hilgendorf, MB. Ak. Berl. 1878, p. 813, pl. ii. figs. 3–5: Kossmann, Reise roth. Meer. Crust. p. 68.

? *Cryptodromia pentagonalis*, Hilgendorf, MB. Ak. Berl., p. 814, pl. ii. figs. 1-2: Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 406.

Carapace etc. with a short velvet-like tomentum.

Carapace not quite as long as broad, only moderately convex, its surface smooth, its regions very fairly indicated: the "cervical" groove is distinct, the fronto-orbital region is marked off by a shallow transverse groove that runs from one antero-lateral angle of the carapace to the other, and the front itself is longitudinally grooved.

Front cut into 3 broad triangular teeth of nearly equal size, the middle one nearly horizontal, but on a much lower plane than the others, which are somewhat upcurved.

A tooth near the middle of the upper border of the orbit marks the position of the true inner supra-orbital angle. Outer orbital angle dentiform. Infra-orbital lobe dentiform and prominent.

True antero-lateral borders with 2 teeth: in the concave space between the 1st (large) tooth and the outer orbital angle a stout subhepatic tooth shows up: below this again is a tooth at the outer angle of the buccal cavern.

On the postero-lateral border, immediately behind the branchial or "cervical" groove, is a tooth.

Outer surface of wrist nodular: a few nodules on upper border of palm: fingers short and stout.

The carpus and propodite of the first 2 pair of legs are nodular.

Last 2 pair of legs short and slender, not nodular, not much more than half the length of the first 2 pair: the 4th (last) pair very little longer than the 3rd. Both end in a strong claw-like dactylus, but are hardly cheliform, although there is a small spine at the end of the propodite of each.

Abdomen of male with a convex ridge down the middle line.

In the Indian Museum are 2 males and a female, from the Andamans and the Persian Gulf.

The carapace of the largest specimen is 14 millim. long.

Distribution: Indo-Pacific Seas from the Red Sea and east coast of Africa to Japan.

9. *Dromia (Cryptodromia) bullifera*, n. sp.

Carapace etc. covered with a short tomentum.

Carapace about as long as broad, convex, smooth, "cervical" groove shallow but distinct.

Front cut into 3 acute rather slender teeth, the middle one of which is on a lower plane and is slenderer than the others.

An acute *spine* near the middle of the upper border of the orbit marks the position of the true inner supra-orbital angle. Outer orbital angle spiniform. Suborbital lobe dentiform, fairly prominent.

True antero-lateral borders of the carapace cut into 2 teeth, the anterior being much the larger and spine-like. In the gap between the 1st tooth and the outer orbital angle two small smooth subhepatic tubercles are visible, one below the other.

An elegant pearl-like tubercle below the sub-orbital lobe, a similar but smaller tubercle in the middle of the exposed surface of the merus of the external maxillipeds and another in the middle of the exposed surface of the second joint of the antennal peduncle, are characteristic.

An extremely inconspicuous denticle on the postero-lateral border, behind the branchial or " cervical " groove.

Outer surface of wrist and upper surface of hand nodular, two of the nodules on the wrist being particularly acute.

Outer surface of carpus and propodite of first 2 pair of legs broken but not nodular.

Last 2 pair of legs slender and very short, ending in claw-like dactyli, but not cheliform.

Abdomen of male convex along the middle line.

One specimen from the Andaman Sea, 490 fathoms, another from off Ceylon, 34 fathoms.

The carapace is between 5 and 6 millim. long.

10. *Dromia* (*Cryptodromia*) *de Manii*, n. sp.

Cryptodromia sp. de Man, Journ. Linn. Soc. Zool., XXII., 1888, p. 211.

Carapace etc. tomentose.

Carapace as long as broad, convex, smooth, the " cervical " groove rather indistinct.

Front cut into 3 teeth, the middle one of which is the smallest and is much deflexed.

A tooth near the middle of the upper border of the orbit (true inner supra-orbital angle). Outer orbital angle dentiform.

Suborbital lobe dentiform, but not very prominent.

True antero-lateral border with two blunt teeth : two more blunt teeth on the subhepatic border and one at the angle of the buccal cavern are continued on from the antero-lateral border.

A tooth on the hepatic region, dorsad of the antero-lateral border, and just behind the outer orbital angle, is characteristic.

A tiny denticle on the postero-lateral border, just behind the branchial or " cervical " groove.

Outer surface of wrist and upper surface of hand nodular; outer surface of hand granular.

Outer surface of carpus and propodite of first two pair of legs uneven but not distinctly nodular.

Last 2 pair of legs short, ending in claw-like dactyli, not cheliform; the 3rd pair shorter than the 4th.

A single small specimen from Mergui (Anderson collection).

11. *Dromia (Cryptodromia) Hilgendorfi*, de Man.

Cryptodromia Hilgendorfi, de Man, Archiv. f. Naturges. LIII. 1887, i. 404, pl. xviii. fig. 3.

Carapace etc. with a short velvet-like tomentum.

Carapace longer than broad, convex, smooth, without distinction of regions. "Cervical" groove broad and shallow.

Front cut into 3 teeth, the lateral ones broad and triangular, the middle one so small and deflexed as to be hardly visible in a dorsal view.

There is no distinct tooth in the upper border of the orbit, but only an angular bulge, to mark the position of the inner supra-orbital angle. Outer orbital angle and sub-orbital lobe not dentiform.

The antero-lateral borders of the carapace are smooth and entire, but as they bend sharply inwards towards the orbits their anterior angle forms a forwardly-directed tooth, the space between which and the outer-orbital angle is concave.

A very small prominence on the postero-lateral border, just behind the branchial or "cervical" groove.

The chelipeds and legs have an uneven surface, but are not really nodular, though both the inner and outer angles of the wrist are strongly pronounced.

The last 2 pair of legs are short and slender, the 4th (last) pair being very little longer than the 3rd; both end in stout claw-like dactyli but are not at all cheliform.

The abdomen bends in very sharply from the 4th segment, making the under surface of the body very flat.

In the Indian Museum are a male and a female from the Persian Gulf.

The carapace of the larger of the two is 12 millim. long.

Distribution: Indo-Malayan coasts.

12. *Dromia (Cryptodromia) ebalioides*, n. sp.

Carapace hardly at all tomentose: a few hairs on the borders of some of the leg-joints.

Carapace subcircular with projecting front, convex, *its surface closely and crisply granular*: not only are all its regions very distinct but they are also areolated, *the individual areolæ being convex, subcircular, and particularly well defined.* The true cervical groove is present, as well as the branchial groove that generally goes by this name.

Front longitudinally grooved, cut into 3 serrulated teeth of which the lateral ones are broadly triangular, while the middle one is narrow and is more prominent than the others.

Upper border of the orbit very oblique, serrulate, devoid of any tooth to mark the inner supra-orbital angle of the higher Brachyura. Outer orbital angle and suborbital lobe not prominent.

Lateral borders of carapace serrulate, not toothed, though there may be a small granular bulge in front of, and another behind, the branchial groove.

Legs and chelipeds crisply granular, the chelipeds and first two pair of legs being also nodular.

Last 2 pair of legs very slender, hardly half the length of the first 2 pair, ending in hook-like dactyli, not cheliform.

First four abdominal terga with some symmetrical granular sculpture, the other three granular but not sculptured.

Three specimens, a male and 2 females, from Karáchi: the carapace of the largest is 7 millim. long and 8 millim. broad.

This species, and the one following, show the transition to *Petalomera*, having a granular carapace, on the dorsal surface of which the true cervical groove is as plain as the branchial groove that is commonly called "cervical."

13. *Dromia (Cryptodromia) Gilesii*, n. sp.

Closely related to *D. sculpta*, Haswell.

Carapace etc. without tomentum: a few hairs on some of the leg-joints.

Carapace pentagonal, convex, its greatest length about equal to its greatest breadth, the greater part of its surface covered with vesiculous granules: not only are all the regions very distinct, but they are also areolated—the areolæ however not being so individually convex as they are in *D. ebalioides*. The true cervical groove is present as well as the branchial groove.

Front cut into 3 triangular teeth, of which the middle one is the smallest and is on a lower plane and obliquely deflexed.

Upper orbital border very oblique: a hardly noticeable angulation —not a distinct tooth—marks the true inner supra-orbital angle. Outer orbital angle not pronounced. Suborbital lobe dentiform but inconspicuous.

Antero-lateral borders of the carapace cut into 5 small granular lobules or tubercles, of which only 2 belong to the true antero-lateral border, the other 3 being on the subhepatic border and at the outer angle of the buccal cavern.

A granular tubercle on the postero-lateral border, just behind the "cervical" groove.

Legs and chelipeds crisply granular, the chelipeds and first 3 pair of legs being also nodular: the nodules on the carpal joints being prominent and acute.

Last 2 pair of legs very slender, hardly half the length of the first 2 pair, ending in hook-like dactyli, not cheliform.

All the abdominal terga are symmetrically sculptured and granular.

In the Indian Museum are 12 specimens, from off the Malabar coast, 29 fathoms.

The carapace of an egg-laden female is 8 millim. long and 8½ millim. broad.

This species is easily distinguished from *D. ebalioides* (1) by the sharply pentagonal carapace and less-completely isolated areolæ, (2) by the much more prominent front, (3) by the antero-lateral borders being broken by irrregular tubercle-like lobules, and (4) by the more abundant sculpture of the abdominal terga: in everything but the form of the meropodites of the chelipeds and first pair of legs it strongly resembles *Petalomera*.

Subgenus Petalomera, Stimpson.

Petalomera, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 226: Ortmann in Bronn's Thier Reich (*loc. cit.*) p. 1155 (name only).

Petalomera closely resembles *Cryptodromia*, especially those species (e.g. *Cryptodromia ebalioides* and *Gilesii*) in which the carapace is granular and has the cervical and branchial grooves both well developed; and, indeed, only differs from *Cryptodromia* in having the upper border of the meropodites of the chelipeds and first, or first two, pair of legs produced to form a crest so high and thin as to give the joint a petaloid shape.

As in *Cryptodromia* the sternal grooves of the female are widely separated, and end on the second segment of the sternum. As in *Cryptodromia lateralis*, there is a small epipodite to the chelipeds.

There can be little doubt that, as Bouvier (Bull. Soc. Philomath. Paris, 1895-96, p. 52) has remarked, *Petalomera* is a form slightly more primitive than *Dromia*.

14. *Dromia (Petalomera) granulata*, Stimpson.

Petalomera granulata, Stimpson, Proc. Acad. Nat. Sci. Philad., 1858, p. 240.

Petalomera granulata var. *indica*, nov.

Carapace etc. hardly at all hairy: edges of the legs with some hairs.

Carapace a little longer than broad, convex in both directions, with numerous unevenly distributed vesiculous granules: all the regions are distinct, but are not all equally well defined. The cervical and branchial grooves are both present.

Front dorsally grooved in the middle line, cut into 3 serrulate teeth, of which the lateral ones are large and triangular, while the middle one is small and is on a much lower plane.

Upper border of orbit serrulate: a tooth near its middle marks the true inner supra-orbital angle. Outer orbital angle pronounced but not dentiform. The suborbital lobe forms a granular tubercle or denticle.

Antero-lateral borders of the carapace cut into 3 granular teeth, the first being subhepatic.

Chelipeds very much more massive than the legs: they and the first pair of legs have the merus petaloid, owing chiefly to the thin expanded crest-like upper border of that joint. The merus of the next pair of legs is not petaloid, though its upper border is sharp. In the chelipeds the inner border of the wrist and the upper border of the palm are prominent and, like the upper and outer surfaces of those joints, are granular: there are also two sharp tubercles at the distal end of the outer surface of the wrist.

The first two pair of legs have a few small granules on some of the joints.

The last two pair of legs are slender and end in small claw-like dactyli, which are opposed to a very small spine at the end of the corresponding propodites: the last pair of legs is very slightly longer than the penultimate pair.

In both sexes the abdomen has a convex ridge down the middle line and the 2nd–5th terga have a few scattered granules on their surface.

The largest specimen is slightly over 15 millim. long, and is 15 millim. broad, but in young specimens the carapace is more elongate.

Colours of fresh spirit specimens: yellow with some reddish markings.

In the Indian Museum are 22 specimons, from the Andamans and from off Ceylon 28 and 34 fathoms.

This variety is to be distinguished from *P. granulata* only in not having the merus of the second pair of legs (3rd pereiopoda) petaloid.

From *P. pulchra* Miers (Zool. H. M. S. "Alert" p. 260, pl. xxvii. fig. A), it differs only in having a tooth on the supra-orbital border, which border is serrulate not entire; in having small spines opposed to the dactyli—at the end of the propodites of the last two pair of legs; and in being more granular.

PSEUDODROMIA, Stimpson.

Pseudodromia, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 226: Henderson, Challenger Anomura, p. 15: Ortmann in Bronn's Thier Reich V. ii., Arthropoda, p. 1155.

Homalodromia, Miers (*nec* Homolodromia A. M. Edw.), Zool. H. M. S. Alert, p. 553.

Differs from *Dromia* in the following particulars :—

The carapace is more elongate: the efferent branchial channels are defined by ridges.

The fourth (last) pair of legs are as long as, or even longer than, the first two pair.

The sternal grooves of the female end in two tubercles placed close together near the bases of the chelipeds.

The front is variable: it may be cut into 3 teeth as in most species of *Dromia*, or may be bilobed, or may consist of a single triangular tooth.

Distribution: Cape of Good Hope, Seychelles, Indian Seas.

N. B.—In *Dromia cranioides*, *Dromia unidentata* and *Cryptodromia tuberculata* the last pair of legs are very little shorter than either of the first two pair.

Key to the Indian species of Pseudodromia.

I. Front cut into 2 teeth, each of which is fused at base with the tooth of the prominent supra-orbital margin; so that the front appears to be formed of two divergent lobes each of which has both its angles acutely produced ... *P. quadricornis.*
II. Front in the form of a single triangular tooth ... ... *P. integrifrons.*

15. *Pseudodromia quadricornis*, n. sp. ?

Perhaps identical with "*Homalodromia*" *Coppingeri*, Miers, *loc. cit.* pl. L. fig. B.

Carapace etc. tomentose: a line of peculiarly long silky hairs forms a fringe or false anterior border to the carapace, behind the deflexed front.

Front deflexed, dorsally grooved in the middle line, cut into two broad teeth, each of which is fused at base with a broad supra-orbital tooth; so that the front appears to consist of two large lobes, each of which has its anterior edge concave and its antero-lateral angles acutely produced.

Carapace in the adult longer than broad, slightly convex from side to side, almost flat fore and aft behind the line of long hairs that marks the frontal declivity: its surface, when denuded, is quite smooth: only the branchial or "cervical" groove and the cardiac region are distinctly marked.

Lateral borders of carapace entire, except that there may be a tiny denticle behind the branchial groove.

Outer orbital angle dentiform. Sub-orbital lobe dentiform, deflexed.

Chelipeds and legs comparatively slender, the chelipeds shorter and hardly stouter than the legs. Two acute tubercles on the outer surface of the wrist.

Fourth (last) pair of legs little slenderer and about as long as either of the first two pair, ending in a slender claw-like dactylus to which a spinule at the end of the propodite is opposed.

Third pair of legs not less stout than, but only about half the length of, the first two pair; ending in a claw-like dactylus.

Length of carapace of an adult female 7 millim., greatest breadth—in front of the branchial groove—6 millim.

Five specimens, representing adults of both sexes, from off Ceylon 34 fathoms, and from the Pedro Shoal (off Malabar coast) 20 fathoms.

16. *Pseudodromia integrifrons*, Henderson.

Pseudodromia integrifrons, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 406, pl. xxxviii, figs. 7–9.

The front is entire and subacute, without any trace of lateral teeth. No supra-orbital tooth. Outer orbital angle poorly marked. The lower orbital margin is formed simply by the antennal peduncle. Chelipeds without any teeth or tubercles. The carpus of the third pair of legs has a prominent lobe at its distal end, anteriorly. Dactylus of fourth (last) pair of legs straight: its propodite with 3 spinules at its far end.

Loc. Tuticorin.

No specimens in the Indian Museum.

CONCHŒCETES, Stimpson.

Conchœcetes, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 226: Ortmann in Bronn's Thier Reich, *loc. cit.* (name only).

All parts, except the dactyli and tips of the fingers covered with a close velvet-like tomentum.

Carapace not elongate in the adult, dorsally quite flat, subpentagonal in outline.

Front cut into 3 teeth, of which the middle one is on a very much lower plane (and is much smaller) than the others.

Palate well delimited from the epistome. Efferent branchial channels well defined.

Chelipeds in the male much more massive and much longer than any of the legs.

The third pair of legs though shorter are not less massive than the first 2 pair, and end in a powerful talon like dactylus. The fourth (last) pair of legs are short and slender.

The sternal grooves of the female do not meet; they end in tubercles on the second segment of the sternum, between the bases of the 2nd pereiopods.

The branchial formula and the number and disposition of the epipodites are exactly the same as in *Dromia Rumphii.*

17. *Conchœcetes artificiosus* (Fabr.).

Dromia artificiosa, Fabricius, Ent. Syst. Suppl. p. 360.

Cancer artificiosus, Herbst, Krabben, III. iii. 54, pl. lviii. fig. 7.

Conchœcetes artificiosus, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 240: Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 407.

Dromia conchifera, Haswell, P. L. S., N. S. Wales, VI. 1881-2, p. 757, and Cat. Austral. Crust. p. 141, pl. iii. fig. 4.

Carapace etc. with a dense short velvety tomentum.

Carapace pentagonal, with the posterior border of the pentagon curved, its dorsal surface quite flat, its greatest length (in the adult) about equal to its greatest breadth, its regions all well defined by grooves, the cervical and branchial furrows both equally well cut. There are sometimes a few granules near the borders of the carapace.

Front cut into 3 teeth with granular edges, the middle tooth being smaller and on a much lower plane than the others.

Upper border of orbit very oblique: a granular spine or tooth marks the true inner supra-orbital angle of higher Brachyura. Outer border of orbit apparently wanting, but on denudation a concave row of granules is found there. Sub-orbital lobe granular and dentiform.

On the lateral borders of the carapace are usually two teeth, one immediately behind the cervical groove, the other immediately behind the branchial groove: one (the posterior) or both of these teeth may be nearly worn away, but usually they are both very distinct. Between the first spine and the orbital tooth is a (sometimes broken) row of granules, and between the same spine and the outer angle of the buccal cavern is a row of granular tubercles: the surface of the subhepatic region between these two rows of granules may, when denuded, be granular or not.

The chelipeds of the adult male are, as in *Petalomera*, much more massive, compared with the legs, than is usual among the *Dromiidæ*: they are also much longer than any of the legs. The outer (exposed) surfaces of all the joints are more or less granular, some of the granules on the palm being very large and visible without denudation: in addition, the upper border of the arm is denticulate, there are 2 coarse tubercles at the far end of the outer surface of the wrist, and 2 on the palm just behind the finger-joint.

The first 3 pair of legs are short, and some of their joints are granular and have a tendency to be nodular, a nodule on the carpus being very constant. Of these legs the 3rd pair ends in a characteristic stout talon-like dactylus the tip of which bends towards a stout lobe at the proximal end of the posterior border of the propodite.

The 4th (last) pair of legs are very slender: they reach to the far end of the carpus of the 3rd pair, and end in a tiny claw-like dactylus.

In both sexes the abdomen has a convexity along the middle line.

This species protects itself with the valve of a Lamellibranch shell, which is held, as in a frame, by the strong hook-like dactyli of the third pair of legs.

In the Indian Museum are 24 specimens, representing both sexes, from the Andamans, from various parts of the Coromandel coast between Tuticorin and the Hooghly Delta, and from off the Indus Delta up to a depth of 62 fathoms. It appears to prefer a muddy bottom. There are also 2 specimens from Hongkong.

Distribution: coasts of India, China, and Australia.

18. *Conchoecetes andamanicus* n. sp.?

Three small specimens from the Andamans differ from adults in the following particulars:—

The carapace, though not flatter dorsally, is more depressed and therefore much shallower.

The front is cut into 2 triangular teeth, between which is a tiny denticle not visible in a dorsal view.

There is no spine or tooth on the upper border of the orbit.

The antero-lateral borders though granular are thin and overhanging, and are without any traces of spines or teeth behind the cervical and branchial grooves. The subhepatic regions are granular but are not bounded by distinct rows of granules.

Instead of two blunt tubercles behind the finger-joint, there is one large subacute tubercle.

SPHÆRODROMIA, Alcock.

Sphærodromia, Alcock, Investigator Deep-Sea Brachyura, p. 16.

All parts except the tips of the fingers and of the dactyli are tomentose.

Carapace not elongate, subglobose. Front broadly triangular, somewhat deflexed, dorsally grooved, rather deeply notched at tip (of the *Dynomene*-type).

Palate well delimited from the epistome: efferent branchial channels defined by ridges.

The chelipeds and legs are as in typical *Dromia*, except that the chelipeds are not at all nodose.

The sternal grooves of the female are wide apart and do not reach to the level of the genital openings, exactly resembling those of *Dynomene*.

Though the gills are phyllobranchiæ the individual gill-plates are narrow and thick and are undoubtedly transitional.

19. *Sphærodromia Kendalli*, Alcock & Anderson.

Dromidia Kendalli, Alcock & Anderson, J. A. S. B. Vol. LXIII. pt. 2, 1894, p. 175: Illustrations of the Zoology of the Investigator, Crustacea, pl. xxiv. figs. 1, 1*a*.

Dromia (*Sphærodromia*) Kendalli, Alcock, Investigator Deep-Sea Brachyura, p. 16.

Carapace etc. covered with a dense, yellowish, velvet-like tomentum.

Carapace sub-circular, globose, smooth except for a few vesiculous granules on the pterygostomian regions and on the posterior part of the sidewall, only the cardiac region and the branchial, or "cervical" groove are marked. [The *true* cervical groove is not distinguishable on the dorsum of the carapace].

The front consists of two triangular teeth. The upper border of the orbit is oblique, but there is no tooth—only a break, or fold, better visible from below than from above—to mark the true inner supra-orbital angle. The outer angle of the orbit is not defined. The sub-orbital lobe is broadly and bluntly triangular.

Lateral borders of the carapace entire, the antero-lateral borders subcristiform and ending at the sub-orbital lobe.

The external maxillipeds when closed leave a gap between their anterior border and the edge of the epistome.

Vesiculous granules are present on the edges of the arms, on the upper and outer surfaces of the wrists, and everywhere on the hands except on the lower part of the inner surface.

The last two pairs of legs are about equal and are about half as long as the other legs: each ends in a small claw-like dactylus which is opposed to two or three tiny spinules at the end of its propodite.

A single female, with the carapace 18 millim. in diameter from the Bay of Bengal, off Nellore coast, 112 fathoms.

20. *Sphærodromia nux*, n. sp.

Differs from *Sphærodromia Kendalli* only in the following particulars :—

The carapace though of the same subglobular shape is a little broader than long; and the antero-lateral border, instead of running to the orbital angle, runs down without interruption to the outer angle of the buccal cavern. The surface of the carapace, especially in its antero-lateral parts, is finely granular under a lens. The sub-orbital lobe is neither dentiform nor prominent.

A male and a female from the Gulf of Martaban, 70 fathoms.

The carapace of the female is nearly 10 millim. long and nearly 11 millim. broad.

Tribe HOMOLIDEA.

Family I. HOMOLIDÆ.

Key to the Indian genera of the Family Homolidæ.

I. Carapace ovoid. External maxillipeds quite pediform : terminal joint of the eye-stalk very much longer than the basal joint, which is obsolescent : dactylus of last pair of legs very small, and shutting down on the slightly expanded *distal* border of the propodite ... ... HYPSOPHRYS.

II. External maxillipeds subpediform, the merus, though not a broad joint, having its outer angle distinctly dilated : terminal joint of the last pair of legs shutting against the *posterior* border of the propodite :—

  1. Carapace subquadrilateral, or urn-shaped, not depressed ; its hepatic spine some distance behind the level of the supra-orbital spine : the terminal joint of the eye-stalk is not always quite as long as the basal joint ... ... HOMOLA.
  2. Carapace urn-shaped, depressed ; its hepatic spine almost on the same level as the supra-orbital spine : the terminal joint of the eye-stalk is a little longer than the basal joint ... ... PAROMOLOPSIS.

HOMOLA, Leach.

Homola, Leach, Trans. Linn. Soc., Vol. XI. 1815, p. 324, and Zool. Miscell. Vol. II. p. 82, pl. lxxxviii : Latreille, Nouv. Dict. d'Hist. Nat. XV. 1817, p. 277, and in Cuvier's Regne Animal, ed. 1829, p. 67 : Desmarest, Consid. Gen. Crust. p. 133 : Risso, Hist. Nat. Europ. Merid. Vol. V. pp. 34-35 : Roux, Crust. de la Mediterranée text of pl. vii : Milne Edwards, Hist. Nat. Crust. II. 181 : deHaan, Faun. Japon. Crust. p. 105 : Dana U. S. Expl. Exp. Crust. pt. I. p. 403 : Heller, Crust. Sudl.

Europ. p. 148: Henderson, "Challenger" Anomura, p. 18: Ortmann, Zool. Jahrb. Syst. etc. VI. 1892, pp. 540 and 542 and in Bronn's Thier Reich, V. ii. Arthropoda, p. 1156: A. Milne Edwards and Bouvier, "Hirondelle" Brachyures et Anomures (Monaco 1894) p. 60: Alcock, Investigator Deep-Sea Brachyura, p. 6.

Carapace deep, longer than broad, quadrilateral or urn-shaped, with deep vertical sides, the gastric region well demarcated and occupying the anterior half of the carapace, the linea anomurica distinct and dorsal.

Front narrow, forming a rostrum, which is either entire or bifid at tip and has a spine, often of large size, on either side of its base.

The orbits are quite incomplete and do not even conceal the eye-stalks, and the eyes, which project far outside them, are retractile against the sides of the carapace. The eye-stalks are long and are composed of two joints, a slender basal joint, and a swollen terminal joint that carries the eye, the terminal joint (with the eye) being nearly as long as the basal joint.

The epistome is fairly or very distinctly marked off from the palate. The expiratory canals are very well defined. The external maxillipeds are subpediform.

The chelipeds are rather slender and generally somewhat spiny. The legs are long and more or less compressed and spiny, the last pair are subcheliform, but have the propodite dilated near the basal end and never twice the length of the dactylus.

The abdomen of both sexes consists of seven separate segments and is rather broad.

The branchial formula is as follows :—

Somites and their appendages.		Podobranchiæ.	Arthrobranchiæ.		Pleurobranchiæ.		
			Anterior.	Posterior.			
VII.	...	0 ep.	0	0	0	=	ep.
VIII.	...	1 + ep.	0	1	0	=	2 + ep.
IX.	...	0 ep.	1	1	0	=	2 + ep.
X.	...	0 ep.	1	1	0	=	2 + ep.
XI.	...	0 ep.	1	1	1	=	3 + ep.
XII.	...	0 ep.	1	1	1	=	3 + ep.
XIII.	...	0	1	0	1	=	2
XIV.	...	0	0	0	0	=	0
		1 + 6 ep.	5	5	3	=	14 + 6 ep.

Distribution: West Indies and Atlantic coasts of N. America, Azores and coast of Portugal: Mediterranean: East Indian Seas from Cape Comorin to the Philippines.

In my *Account of the Investigator Deep Sea Brachyura*, I have proposed the following subdivision of the genus *Homola* :—

1. HOMOLA. Carapace square-cut, its broadest part being in front, across the middle of the gastric region: the *linea anomurica* rather

inconspicuous, keeping close to the lateral border. Rostrum a non-cylindrical bifid tooth, with a smaller spine on either side of its base. 2nd joint of antenna-peduncle having its antero-external angle produced to form a spine. Palate distinctly delimited from the epistome everywhere except in the middle line. The last pair of legs reach to the end of the carpus of the preceding pair.

TYPES *H. barbata* (Herbst) and *H. andamanica*, Alcock.

HOMOLAX. Carapace urn-shaped, its greatest breadth being behind, across the middle of the branchial regions: the *linea anomurica* conspicuous, running well inside the lateral border. Rostrum as in *Homola*. 2nd joint of antenna-peduncle having its antero-external angle acute, but not spiniform. Palate as well demarcated from the epistome in the middle line as it is elsewhere. The last pair of legs reach beyond the end of the carpus of the preceding pair.

TYPE *H. megalops*, Alcock.

PAROMOLA Wood-Mason. "Carapace decidedly macrurous in form," its greatest breadth being behind: the *linea anomurica* very conspicuous and well inside the lateral border. Rostrum a simple cylindrical spine of large size, flanked on either side by a single spine of equal or greater size. 2nd joint of antenna-peduncle not produced or specially acute at the antero-external angle. Palate everywhere well demarcated from the epistome. The last pair of legs not reaching beyond the end of the merus of the preceding pair.

TYPES *H. cuvieri*, Roux and *H. profundorum*, Alcock.

Subgenus *Homola*.

21. *Homola andamanica*, Alcock.

Homola andamanica, Alcock, Investigator Deep-Sea Brachyura, p. 7: and Illustrations of the Zoology of the Investigator, Crustacea, pl. xl. fig. 1.

This may, very possibly, prove the same as *Homola orientalis* Henderson, though it cannot be quite reconciled with the description, still less with the figure, of that species.

In any case it is probably only a variety of *Homola barbata*, with 3 good specimens of which—representing both sexes—it has been compared. The only differences between it and *H. barbata* are the following:—

The eyes are more reniform. The second spine of the lateral border is just behind the hepatic region. There are spines on the posterior border of the meropodites of all four pairs of walking legs.

Carapace elongate-subquadrilateral, its greatest breadth is across the middle of the gastric region, behind which point its sides are quite straight and vertical: it is well calcified, and, like all other parts except the antennary flagella, is covered with short soft but stiff hairs that are not thick set enough to form a coat of concealment.

Rostrum a depressed grooved tooth, bifid at tip. Four spines on the anterior border of the carapace, namely, one on either side of the rostrum, one at either supra-orbital angle.

Lateral borders of dorsum of carapace straight, very slightly convergent, spinate; the first spine, which stands alone on the hepatic region, is of pre-eminent size, the second though much smaller than the first is much larger than any of the others.

Gastric region very well demarcated, armed with nine large spines —three in a triangle on either median area, one on either lateral area, and one on the hinder part of the central area.

Some spines on the subocular, subhepatic, and pterygostomian regions—largest on the subocular region, where they are definitely arranged in two crescentic rows. Two spines, one *beside* the other, on the carapace outside the antenna-peduncle, in addition to the spinuliform suborbital angle.

Eyes somewhat reniform.

Chelipeds slender, but distinctly stouter than the legs, more hairy than the carapace, especially along the edges of the joints. Upper and lower borders of arm spiny; wrist with rows of spines on the outer surface and a spine or two at the inner angle; lower border of hand spiny, upper border of hand denticulate, cutting edges of fingers sharp, entire.

Legs compressed, their edges plumed with short bristles, with long bristles interspersed. The second and third pair, which are a dactyl-length longer than the first, are not quite 2½ times the length of the carapace: in all three pairs both edges of the merus are armed with stout spines—at least in the distal half, and the posterior border of the propus and dactylus with compressed articulated spines which are distant and acicular on the propus but stout very regular and close-set on the dactylus.

The subcheliform fourth pair of legs reach very slightly beyond the end of the carpus of the preceding pair: the merus has 3 or 4 spines on the lower border and a terminal spine on the upper border, the claw-like dactylus closes against a bunch of spines on the near end of the propus.

In the Indian Museum are a male and female from the Andaman Sea, 79–90 fathoms; the carapace of the female is about 27 millim. long, and about 21 millim. wide.

Subgenus *Homolax.*

22. *Homola megalops*, Alcock.

Homola megalops, Alcock, Ann. Mag. Nat. Hist., May 1894, p. 408: Illustrations of the Zoology of the R. I. M. S. 'Investigator,' Crustacea pl. xiv. figs. 1, 1*a*: Investigator Deep-Sea Brachyura, p. 9.

Carapace urn-shaped, its greatest breadth is across the middle of the branchial region; its sides, and still more the spinulate lateral borders of its dorsum, are elegantly curved; the hairs that cover it are so inconspicuous as to be recognizable only with a lens.

Rostrum a depressed grooved tooth, entire, or emarginate at tip. Four spines on the anterior border of the carapace arranged as in *H. barbata.*

The only enlarged spine of the lateral border stands alone on the hepatic region.

Nine spines on the gastric region—two immediately behind the spines at the base of the rostrum, the other seven in an open S-shaped curve across the middle of the region.

A single row of spines on the subocular region, which region is remarkably hollowed for the reception of the retracted eye. Two spines, one above the other, on the carapace beside the antenna-peduncle, in addition to the bluntly-dentiform suborbital angle.

Eyes reniform, very large, their major diameter being one-sixth the breadth of the carapace.

Chelipeds slender, their arms and wrists distinctly slenderer than the meropodites of the legs: in the adult male they do not reach halfway along the merus of the first pair of legs: they are covered with a short inconspicuous velvet, with hardly any long bristles on the edges of the joints: they are armed much as in *H. barbata*, but the *upper* border of the hand is spiny and the lower border faintly denticulate. The fingers, which have a sharp entire cutting-edge, are as long as the rest of the hand.

The legs have the surface—especially the dorsal surface—of most of the joints covered with a close short velvet, but have few or no bristles along their edges. The 2nd and 3rd pair, which are nearly a dactylus longer than the first, are nearly three times as long as the carapace: the subcheliform 4th pair reach beyond the end of the carpus of the preceding pair. The first three pair have the anterior edge of their greatly compressed meropodite closely spinate, and the posterior edges of that joint and the ischium closely spinulate; their last three joints have the edges smooth, except for a few small jointed spinules at the base of the posterior border of the dactylus. The last pair of legs have the posterior edge of their subcylindrical meropodite closely spinate and have only a single terminal spine on the upper edge, the carpus has a strong terminal spine on its posterior border, and the propus has a salient group of spines behind the middle of its posterior border forming a subcheliform stump for the serrated posterior edge of the claw-like dactylus.

Colour in life salmon-pink.

Andaman Sea, 188–220 fathoms, a male and a female; 370–419 fathoms, 3 males and 3 females. Bay of Bengal, off Coromandel Coast, 145–250 fathoms, a male and a female. Gulf of Manár, off Colombo, 142–400 fathoms, 2 young males.

Dimensions of carapace of a full-grown specimen 41 millim. long, 36 millim. broad.

The gills are fourteen in number on either side, arranged as in *Homola barbata*, exclusive of a quite rudimentary posterior arthrobranch to the penultimate pair of legs.

Subgenus *Paromola*.

23. *Homola profundorum*, Alcock and Anderson.

Homola profundorum, Alcock and Anderson, Ann. Mag. Nat. Hist. Jan. 1899, p. 5: Alcock, Investigator Deep-Sea Brachyura, p. 10, pl. i. fig. 2.

Carapace very decidedly macruriform, deep, ovoid-triangular, broadest abaft the middle of the branchial region, tapering to an acutely-spiniform rostrum of which the length is about a third that of the rest of the carapace. Diverging from either side of the base of the rostrum is a spine of similar form and size. The only other elevations on the carapace are a hepatic spine just behind the hollow for the retracted eye, an antennal spine just outside the antennal base, and a blunt denticle near the middle of the ill-defined lateral border.

The gastric region is well delimited, and the *linea anomurica* is broad conspicuous and dorsal.

The stout cylindrical terminal joint of the eye-stalks is longer than the slender basal joint, the eyes are of good size, well pigmented, and hemispherical.

The chelipeds are slender but are stouter than the legs; the arm has the outer lower border spinate and, on the upper border, a few spinules and a strong terminal spine; both the inner and the outer angles of the wrist are armed with a strong spine, the fingers are much shorter than the hand and have the cutting-edge entire.

The legs are slender and subcylindrical, the 2nd and 3rd pair, which are slightly longer than the first, are at least three times the length of the carapace. In the first 3 pair there are a few distant spines and a strong terminal spine on the anterior border of the merus, a few articulating spinules at the far end of the posterior border of the propodite, and a comb of articulating spines along the posterior border of the dactylus—the last joint being but half the length of the last but one. The dorsal fourth pair of legs are far slenderer than the others and do not reach the end of the merus of the preceding pair: their propodite is triangular, owing to the expansion of its posterior border, and opposes a sharply-serrated edge to the less strongly toothed posterior border of the short dactylus—the parts being cheliform rather than subcheliform.

The body and appendages are coated with very short distant bristles which do not conceal the surface: there are some longer and thicker bristles along the edges of the chelipeds, and a very few scattered hairs along the edges of the legs.

Three young females from off the Travancore coast, 430 fathoms.

The carapace of these is about 13 millim. long, and about 9 millim. in greatest breadth.

PAROMOLOPSIS, Wood-Mason.

Paromolopsis boasi, Wood-Mason, Ann. Mag. Nat. Hist., March, 1891, p. 268.
Paromolopsis, Alcock, Investigator Deep-Sea Brachyura, p. 11.

Resembles *Homola* but differs in the following important particulars :—

The carapace is "more brachyurous :" it is urn-shaped and *depressed*, its sides being far from vertical and being overhung by the sharply defined lateral borders. The hepatic region is elongate and advanced, so that the hepatic spine is on a level with the spines of the anterior border, and helps to form a very decided false-orbit. The buccal cavern is scarcely broader in front than behind.

In other respects it agrees with *Homola* and more particularly with the subgenus *Homolax*.

The branchial formula is the same as that of *Homola*.

24. *Paromolopsis boasi*, Wood-Mason.

Paromolopsis boasi, Wood-Mason, Ann. Mag. Nat. Hist., March 1891, p. 268 and fig. 5: Alcock, Investigator Deep-Sea Brachyura, p. 11.

Every exposed surface of the body and appendages, excepting only the flagella of the antennæ, is covered with an even, velvet-like, tomentum.

Carapace ending in a short triangular rostrum with an upturned tip, its greatest breadth, which is across the middle of the branchial regions, is equal to its length without the rostrum. Unlike the species of *Homola*, the lateral border is well-defined throughout, is carinated, is co-extensive with the length of the carapace, and ends in a large triangular hepatic spine the tip of which is on a level with the tips of the spines of the anterior border: these are four in number, one on either side of the rostrum and one at either outer orbital angle.

There is an antennal spine and spinule, there are some definitely-placed nodular swellings on the well defined gastric region, and the surface of the denuded carapace is granular, but there are no spines other than those mentioned.

The swollen terminal joint of the eyestalk is rather longer than the slender basal joint: eyes of good size, well pigmented, hemispherical, retractile into a very decided hollow in the front wall of the hepatic region.

The 2nd joint of the antenna-peduncle is not produced or acute at the antero-external angle; the antennal flagellum is much longer than the carapace.

Chelipeds (in the adult female and young male) short, just reaching beyond the end of the carpus of the first pair of legs: the arm is slenderer than the corresponding joint of the first three pair of legs: the fingers are longer than the hands: none of the joints are spinate.

The second and third legs, which are longer than the first by their dactylus, and longer than the fourth by their merus and dactylus, are 3 times the length of the carapace. In the first three pair of legs the anterior border of the meropodite is armed with large spines, but the other joints are unarmed: the dactylus is slender, curved, and of great length, being hardly shorter than the preceding joint.

In the subcheliform, dorsal, fourth pair the anterior border of the merus ends in a spine and the posterior border of the merus is spiny throughout, the propus is much dilated and toothed at its basal angle posteriorly, so as to be *l*-shaped and has one or two spines on the undilated portion of its posterior border, and the dactylus is short and is toothed along the posterior border.

The abdomen of the male consists of seven segments.

The carapace of an adult female is 45 millim. long and 43·5 millim. broad.

The colours in life vary from red to bluish-pink.

In the Indian Museum are a large female and three young females from off the Andamans, 480–500 fathoms, 498 fathoms and 561 fathoms; a young male, a large adult female and four young females from off the Travancore coast, 406 and 430 fathoms; a large female with eggs from off the Laccadives, 360 fathoms; and a young female from off Colombo, 597 fathoms.

HYPSOPHRYS, Wood-Mason.

Hypsophrys superciliosa, Wood-Mason, Ann. Mag. Nat. Hist., March, 1891, p. 269.

Hypsophrys, Alcock, Investigator Deep Sea Brachyura, p. 12.

Carapace deep, longer than broad, quadrilateral or ovate-oblong, with deep vertical parallel sides, the gastric region well delimited and occupying its anterior half, the *linea anomurica* dorsal, distinct or indistinct.

Front narrow, forming a simple or bifid rostrum which has a spine on either side of its base.

The orbits do not afford any concealment to the eyes, but form, on either side of the rostrum, a broad concave facet sharply marked off from the rest of the carapace by a ridge that arches round dorsally from the rostrum to the antennal spine: at the upper and inner angle of this facet is a well defined hollow that catches the knee of the 2nd and 3rd joints of the antennulary pedencle when fixed. The eyes are well formed: the terminal joint of the eyestalk is barrel-shaped much as in *Homola*, but the slender basal joint is short or obsolescent, so that the eyes do not appreciably project beyond the edge of the orbital facet.

The antennules and antennæ are identical with those of *Homola*.

The mouth-parts also are very like those of *Homola*, but as the outer border of the merus of the external maxillipeds is hardly at all expanded these appendages are even more pediform than in *Homola*.

Chelipeds slender, spiny, equal. Legs of the first three pair long, with broad compressed meropodites. Fourth pair of legs short, very slender, cheliform, their dactylus, which is many times shorter than their propus, shutting down against and co-terminous with the slightly expanded distal end of the propus.

The abdomen of both sexes consists of seven separate segments.

In general form *Hypsophrys* resembles *Homola barbata*, but it differs from *Homola* in the following particulars:—

1. The eyestalks are like those of *Dromia*, the long slender basal joint of *Homola* being reduced to next to nothing.

2. Though there are no true orbits there are distinct orbital facets, and the homologies of these with the orbits of *Dromia*—in respect both of conformation and of common use for eyes and antennules—are unmistakeable.

3. The external maxillipeds are unequivocally pediform, the merus being hardly broader than the ischium.

4. The fourth (last) pair of legs have the subchelæ or chelæ quite different in form: the propodite is long and is slightly expanded at its distal end, and the dactylus is a minute joint, ever so much smaller

than the propodite, that shuts down against the *distal border* of the latter like the blade of a knife.

The branchial formula of *Hypsophrys* is exactly the same as that of *Homola*.

25. *Hypsophrys superciliosa*, Wood-Mason.

Hypsophrys superciliosa, Wood-Mason, Ann. Mag. Nat. Hist., March 1891, p. 269: Illustrations of the Zoology of the "Investigator," Crust. pl. xiv. figs. 4, 4*a*, 1895: Alcock, Investigator Deep Sea Brachyura, p. 14.

Rostrum simply pointed. Linea anomurica rather indistinct.

Four small spines or teeth on the anterior (orbital) border of the carapace, two being far apart at the base of the rostrum and one at either outer orbital angle. Two, or all four, of these teeth may be obsolescent or obsolete.

Lateral borders of dorsum of carapace not defined, except by a single isolated spine on the hepatic region. Gastric region sharply subdivided into three subregions, of which the lateral are somewhat nodular. Two or three spines on the subhepatic and suborbital region, the innermost of which is "antennal," also sometimes a few spinules.

Eyes well formed and facetted, but pale. Antennal flagella about half again as long as the carapace.

The pediform external maxillipeds have their surfaces and edges devoid of spines.

Chelipeds slender, but much mere massive than the legs, about half a hand-length shorter than the first pair of legs in the adult male: spines and spinules in rows on edges and on both inner and outer surfaces of arms, wrists and hands: fingers about three-fourths the length of the palm.

The second pair of legs, which are slightly longer than the first and third and considerably more than twice the length of the fourth, are slightly more than three times the length of the carapace.

In the first three pair the meropodites are compressed, with the anterior border spiny and the posterior border much less strongly and profusely spiny; the other joints are slender and unarmed, except for a few articulating spinelets at the far end of the posterior border of the propodite and in the basal half of the posterior border of the dactylus; the dactylus is slightly shorter than the propodite.

The fourth (dorsal) pair are very slender and are unarmed except at their cheliform ending: their propodite is many times longer than the dactylus.

The terminal joint of the male abdomen is bluntly triangular.

There are some soft bristles on the chelipeds, and a few on the legs, and some very short and inconspicuous hairs on the carapace.

Colours in life, pink.

The carapace of a large egg-laden female is 19 millim. long and 15 millim. broad.

This species has frequently been taken in the Laccadive Sea and in the sea to the north of the Laccadives at depths ranging from 740 to 931 fathoms, on soft bottoms.

In the Indian Museum are more than 30 specimens representing both sexes, both adult and in young stages.

26. *Hypsophrys longipes*, Alcock and Anderson.

Hypsophrys longipes, Alcock and Anderson, Ann. Mag. Nat. Hist., Jan. 1899, p. 6: Alcock, Investigator, Deep-Sea Brachyura, p. 15, pl. i. fig. 1.

Rostrum deeply bifid. Linea anomurica distinct.

Four large spines on the anterior border of the carapace—two close together at the base of the rostrum, one at either orbital angle.

Lateral borders of dorsum of carapace well defined, spinulate; the ridge on the side-wall of the carapace that defines the branchial regions anteriorly is also spinulate. A row of spines on the hepatic region, the largest of which is on the lateral border of the carapace and has a spine dorsad of it.

Gastric region obscurely subdivided, each lateral subregion is armed with 5 or 6 large spines, while on the median region there is a central spine sometimes followed by a row of spinules. Subhepatic and suborbital region with numerous large spines, one of which is "antennal."

Eyes well pigmented. Antennal flagella more than twice the length of the carapace.

Rows of spinules on the exposed surface of the ischium merus and exognath of the external maxillipeds, and a row on the basal joint of the antennules.

Chelipeds slender, reaching not far beyond the end of the carpus of the first pair of legs, the arm and wrist not stouter than the meropodites of the first three pair of legs; spinate and spinulate as in the preceding species; fingers as long as the hand.

The second and third pair of legs, which are slightly longer than the first and three times as long as the fourth, are four times the length of the carapace. In the first three pair of legs the merus is compressed and has its anterior border spinate and its posterior borders spinulate, the posterior border of the propodite carries a few distant articulating spinelets, and the dactylus—which is about two-thirds the length of the preceding joint—has a close comb of articulating spines along its posterior border.

The fourth (dorsal) pair, which are extremely slender, have the posterior border of the merus strongly spinate: the propodite is several times longer than the minute dactylus.

The terminal joint of the male abdomen ends acutely.

Hairs and bristles are sparsely present just as in the preceding species.

The carapace of a large egg-laden female is 38 millim. long and 30 millim. broad.

In the Indian Museum are eleven specimens, representing adults and young of both sexes, dredged off the coast of Travancore at 430 fathoms, on a bottom which, though muddy, was abundantly covered with coral.

Family II. LATREILLIDÆ.

Key to the genera of the Family Latreillidæ.

I. Carapace subquadrilateral. Antennæ long. All seven abdominal segments distinct in both sexes ... ... LATREILLOPSIS.

II. Carapace piriform, its anterior portion forming a long subcylindrical "neck." Antennæ short. The 4th, 5th, and 6th abdominal segments of the female are fused together ... ... LATREILLIA.

LATREILLOPSIS, Henderson.

Latreillopsis, Henderson, Challenger Anomura, p. 21: Ortmann in Bronn's Thier-Reich, v. ii. Arthropoda, p. 1156.

Carapace subquadrilateral, deepish, with vertical side-walls, not entirely concealing the basal joints of the legs: the regions fairly well indicated. Front of moderate width, ending in a spiniform rostrum on either side of which is a long slender divergent "supra-ocular" spine. Linea anomurica present, most distinct posteriorly.

Eyes as in *Latreillia*, large and borne free at the end of slender eyestalks of remarkable length. Antennæ long, freely movable from their base; the peduncle slender, cylindrical, and consisting of four joints, as usual.

Epistome well demarcated from the palate. Buccal cavern much broader in front than behind, the efferent branchial channels very well defined. Though the external maxillipeds do not quite meet across the buccal cavern they are distinctly operculiform, owing to the expansion of their merus.

Chelipeds long and slender but much shorter than the first three pair of legs: their joints, like those of the legs, are cylindrical, and the palm in the male is enlarged and club-shaped.

Legs slender, the first three pair very long; the fourth pair reduced in length, and subchelate.

The abdomen in both sexes consists of 7 separate segments.

The branchial formula is exactly the same as that of *Latreillia pennifera*, and is as follows:—

Somites and their appendages.	Podobranchiæ.	Arthrobranchiæ.		Pleurobranchiæ.		
		Anterior.	Posterior.			
VII.	0 ep.	0	0	0	=	ep.
VIII.	1 + ep.	0	0	0	=	1 + ep.
IX.	0 + ep.	1	1	0	=	2 + ep.
X.	0	1	1	0	=	2
XI.	0	0	0	1	=	1
XII.	0	0	0	1	=	1
XIII.	0	0	0	1	=	1
XIV.	0	0	0	0	=	0
	1	2	2	3	=	8 + 3 ep.

Distribution: Oriental Seas (Andaman S. and Philippine S.).

27. *Latreillopsis bispinosa*, Henderson.

Latreillopsis bispinosa, Henderson, Challenger Anomura, p. 22, pl. ii. fig. 3. ♀.

Carapace longer than broad, shaped much as in *Homola*: frontal region with three sharp slender spines, the middle one—which is the shortest and is slightly deflexed—being the rostrum, the other two—which are about a third the length of the carapace and are slightly uptilted—being placed above the bases of the eye-stalks.

Gastric region tumid, with a tubercle posteriorly and a curved transverse row of tiny tubercles anteriorly. Cardiac region small, tumid, culminating in two tubercles placed side by side or confluent. Branchial regions with an irregular surface, and with one or two tiny spinules on the side wall.

Hepatic regions standing out like a pair of little wings, with two spines—the foremost of which is nearly as long as the rostrum—projecting obliquely forwards from their prominent outer angle, and with one or two small spinules on their under surface.

Eyestalks nearly as long as the supra-ocular spines. Antennal peduncle about as long as the eyes and eye-stalks combined, the flagellum more than three-fourths the length of the carapace.

Chelipeds and legs slender, cylindrical, practically smooth, except for a spine at the far end of the anterior (extensor) border of the merus.

The chelipeds in the male are just over twice, in the female less than twice, the length of the carapace without the rostrum. In the female they are hardly stouter than the legs; but in the male they are distinctly stouter, especially as regards the palm, which is club-shaped: the palm is much longer than the fingers.

The first three pair of legs increase in length, gradually but slightly, from before backwards, the 3rd pair being between 4 and 4½ times the length of the carapace: the dactyli are long and curved.

The fourth pair of legs are a little longer than the male chelipeds: their last two joints are short, and the dactylus folds down, like a knife-blade, on a double row of spines along the posterior border of the propodite.

In both sexes the last abdominal tergum is shaped like a spear-head, and the 2nd, 3rd, 4th and 6th terga have an acute tubercle in the middle line.

The carapace of an egg-laden female is 8 millim. long, the same length as that of an apparently adult male.

Colours in spirit yellow, the fingers and eyes dark brown.

In the Indian Museum are two males and a female from the Andaman Sea, 53 fathoms (*not* the same station as that where Latreillia was dredged).

Distribution: Off the Andamans and off the Philippines.

LATREILLIA, Roux.

Latreillia, Roux, Crust. Medit. pl. xxii. and text: Milne Edwards, Hist. Nat. Crust. I. p. 277: DeHaan, Faun. Japon., Crust., p. 105: Heller, Crust. Sudl. Europ. p. 146: Henderson, Challenger Anomura, p. 23: A. Milne Edwards and Bouvier, Crust. Decap. Hirondelle, Brach. et Anom. (Monaco 1894) p. 59: Bouvier, Bull. Soc. Philom. 1896, p. 64: Ortmann in Bronn's Thier-Reich, V. ii., Arthropoda, p. 1156.

Carapace elongate-piriform, not covering the basal joints of the legs, its anterior part prolonged to form a subcylindrical "neck" at the end of which are the spiniform rostrum, lying deflexed between two long slender divergent "supra-ocular" spines, the eyes, the antennules, and the antennæ. The regions are fairly well indicated, and there is no *linea anomurica*.

Eyes much as in *Homola*, large and borne free at the end of very long and slender basal stalks. Antennæ short, of filiform slenderness, freely movable from their base.

Epistome of great length fore and aft, corresponding with the "neck" of the carapace. Buccal cavern well demarcated from the epistome, the efferent branchial channels well defined. External maxillipeds not completely closing the buccal orifice: they have a pediform cast, the ischium and merus being rather narrow and the flagellum coarse.

Chelipeds long and slender, but always much shorter than the first three pair of legs: all the joints are slender, except the palm, which in one or both sexes is club-shaped. Fingers shorter than the palm.

First three pair of legs very long and slender; some of their joints are spiny.

Fourth pair of legs more or less reduced in length, subdorsal in position.

The abdomen of the male consists of seven separate segments; that of the female consists of five segments—the 4th, 5th and 6th being fused together.

The branchial formula given by Bouvier for *Latreillia elegans*, and verified by myself for *Latreillia pennifera*, is as follows:—

Somites and their appendages.	Podo-branchiæ.	Arthrobranchiæ.		Pleuro-branchiæ.	
		Anterior.	Posterior.		
VII.	0 ep.	0	0	0	= 0 ep.
VIII.	1 + ep.	0	0	0	= 1 + ep.
IX.	0 + ep.	1	1	0	= 2 + ep.
X.	0	1	1	0	= 2
XI.	0	0	0	1	= 1
XII.	0	0	0	1	= 1
XIII.	0	0	0	1	= 1
XIV.	0	0	0	0	= 0
	1 + 3 ep.	2	2	3	= 8 + 3 ep.

Distribution: Atlantic coasts of North America between 38° and 40° N.: off the Canaries and Azores: Mediterranean Sea: Bay of Bengal and Andaman Sea: Japanese Seas: New South Wales coast.

28. *Latreillia pennifera*, n. sp.

Very closely related to *L. elegans*, Roux.

Carapace smooth, without spines, though the hepatic regions have a strong bulge: the "neck" is rather slender (equally so in both sexes) and is nearly as long as the rest of the carapace measured in the middle line.

Rostral spine short, acute, strongly deflexed. Supraocular spines as long as the eyestalks, about half the total length of the carapace ("neck" included) measured in the middle line; occasionally bearing some tiny secondary spinules.

Antennules slightly longer than the eyestalks: the outer flagellum longer and very much coarser than the inner.

The chelipeds, which are slightly longer in the male than in the female, are between 3½ and 4 times the total length of the carapace:

their joints are long, slender, and cylindrical, except the palm of the male, which is club-shaped: there are a few spines on the arm, but the other joints are smooth: the fingers are not half the length of the hand (palm).

The first three pair of legs, though they increase slightly in length from before backwards, are not very dissimilar in length, the first pair being nearly 8 times the total length of the carapace. All their joints are slender: the merus is spinate, the carpus sparsely spinate, and the propodite is slightly dilated at the far end of the posterior border where there are a few spines.

The last pair of legs are between 4½ and 5 times the total length of the carapace and reach almost to—in the female even beyond—the end of the carpus of the last pair but one: the merus is rather sparsely spinate, chiefly on the posterior border, and the propodite is plumed on both sides so as to exactly resemble the vane of a feather: the dactylus is extremely short.

In both sexes the last abdominal segment is shaped like a spear-head: in the female the 2nd and 3rd abdominal terga have a median spine and the 4th has a spine at the proximal end of either lateral border.

Colours in spirit yellow. In life the carapace is reddish with longitudinal stripes of dark red, the eyestalks chelipeds and legs are closely cross-banded with red, and the eyes are purplish black.

The carapace of an adult female, with eggs, is 11 millim. long.

14 specimens from the Gulf of Martaban, 53 and 67 fathoms, and from off the northern end of Ceylon, 28 fathoms.

A List of the Butterflies of Ceylon, with Notes on the various Species.—

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The Island of Ceylon is so well known that a lengthened description of its peculiarities is unnecessary. It may roughly be divided into two regions, the low and hill country. The latter comprises the south-west and central portions of the Island exclusive of the south-west coast line, and receives the greater portion of the annual rainfall. The hills rise to 8,000 ft., the highest, Pedro Point close to Nuwara Eliya, being 8,200 ft. The vegetation from 6,000 ft. upwards gradually becomes of a more temperate character. At Nuwara Eliya, 6,000 ft., both tropical and sub-tropical vegetation occurs, the latter preponderating.

The higher forests are very thick, almost impenetrable, always soaking with moisture, and consequently butterfly life is almost absent. In fact, very few butterflies occur from 7,000 ft. upwards, the seasons seem to be too cold and damp for them, and even those found at 6,000 ft. appear to be passengers from the low country. A few, but very few, are found only in what may be called the upper hill district. The middle and low hill districts from 6,000 ft. to 400 ft. are very largely under tea cultivation, but in those few localities where the jungle has been left butterflies abound, and it is remarkable what a number of different species survive in a very limited patch of forest. This part of the Island has, perhaps, been better worked than any other, as it is the home of the planter, many of whom take an interest in entomology. The low country, from 400 ft. to the seaboard, is of course entirely tropical. The Northern, Eastern, North-Western and North-Central areas are either covered with dense forest or are open and park-like. They are in most places unhealthy from malaria, and are very hot and dry. The Hambantota district on the south coast is of a similar character. Large portions of this low jungle country is practically uninhabited, very difficult to get about in, and consequently its entomological peculiarities are not well known. There is such a sameness in the vegetation, rainfall, and characteristics of this part of the country generally, that we doubt there being many more species remaining to be discovered, and these are likely to be either South Indian species or local forms. Many and various attempts have been made by collectors to obtain specimens from these out-of-the-way places by employing natives; but experience has shewn that it is a pure waste of money, ending only in vexation of spirit. A more idle, worthless lot than the native butterfly-hunters of Ceylon does not exist; the reason being that living is so cheap, clothes almost unnecessary, and labour so dear, that there is little or no incentive to work. The best plan for those who have sufficient leisure is to adopt Messrs. Mackwood and Fairlie's method, and fit out one or two bullock carts and camp out, travelling slowly from place to place. This can be made very enjoyable, more especially if the entomologist is a sportsman as well, as game, large and small, abounds in many places, and he can combine the two very satisfactorily; but on the other hand July, one of the best months in the Northern Province, is the worst for shooting; so that unless more than butterflies are studied, the entomologist will find time hang heavily on his hands, as the number of species is undoubtedly few, the whole number of Ceylon butterflies only amounting to some 228 species. The following extract from the *Ceylon Independent* will give a very good idea of the rainfall of the various districts in the Island :—

"The Surveyor-General has published with his Meteorological Report for last year a map of the Island, shewing the Average Annual Rainfall. We find from a comparison of this map with that supplied for the previous year that there is hardly any change in the amount of rainfall recorded in the different districts in 1896 and 1897. The district roughly included between Nawalapitiya and Watawala is the rainiest district of the Island, having the large annual rainfall of 200 inches and more. Taking this as the centre, the districts of the Island may be arranged round it roughly in concentric circles according to rainfall. The district next in point of rainfall to the Nawalapitiya-Watawala district is that portion of the country in which are included Awissawella, Labugama and the Ratnapura districts with a rainfall of 150 inches and more. Next comes a large tract with a rainfall of 100 inches and more. In this tract are included the sea-board districts of the Western Province excluding Colombo, and of the Southern from Galle to Ambalangoda. A large part of the Central Province except the Nuwara Eliya district is also included in this tract. Next in order comes an area with 75 inches and more of rainfall in which are included Colombo and Kandy, the route of the Railway between those two towns, the district of Galle, and the rest of the Central Province not included in the area mentioned before. The driest parts of the Island come next. These dry districts can be divided into two areas, one with a rainfall of 50 inches and more, and the other with a rainfall of under 50 inches. In the former are included the N.-W.P. except the Puttalam district, the whole of the N.-C.P., half of the Jaffna Peninsula, Mullaittivu, Trincomali, Batticaloa, the Matara district, and strange to say Dumbara though surrounded by very rainy districts. The last place is occupied by Puttalam, Mannar, Jaffna, Tangalle and Hambantota. We should like to make a remark with reference to the two dry zones of the Island mentioned above, which represent the largest portion of the Island. At one time they were the most populous and prosperous, but now the most sparsely populated and most unhealthy districts of the Island. The ruin of these districts is due entirely to the fact that the rainfall is not now stored for the purposes of cultivation as was done in ancient time."

The seasons are very well marked, and consequently those genera such as *Terias* which are subject to seasonal variation show these modifications very distinctly. The dry-season begins about the end of January, and lasts with an occasional shower until the burst of the South-West monsoon in the beginning of June. As soon as this is established butterfly life becomes abundant, but gradually diminishes as the monsoon dies away. In September there is usually a spasmodic revival just before the setting in of the North-East monsoon in the middle of October. After the initial heavy rains, butterflies start afresh in November, December and January, and it is in these months more especially, though to a slighter extent at the beginning of the South-West monsoon, that the extraordinary migratory flights of butterflies take place. These flights are perfectly amazing and scarcely credible. At Colombo, where Manders has more particularly noticed them, the direction of the flight is always northerly and principally along the seashore, possibly the more readily to avoid obstacles. The species which comprise these sensational flights are the following to the exclusion of almost any other:—*Euplœa asela*, Moore (and *E. montana*, Felder, at Nuwara Eliya in May), *Appias albina*, Boisduval, and *Appias paulina*, Cramer, the two *Catopsilias*, *Papilio demoleus*, Linnæus, and *Belenois mesentina*, Cramer, irregularly. He calculated the number passing two fixed points 20 yards apart close to the edge of the sea, and concluded that not less than 14,000 passed between these points during the hours the flight lasted from 10 A.M. to 2 or 3 P.M. There is no doubt that other species migrate also at uncertain intervals. Mr. Green informs us that *Jamides bochus*, Cramer, does, and so also does *Polyommatus bæticus*, Linnæus. We are not prepared to put forth any hypothesis to account for this phenomenon, though it is a subject of great interest and well worth study, but it requires a large number of skilled observers over a considerable area and for several years, and unfortunately it is difficult to secure these. The central mass of hills checks the spread of the south-west rain from reaching the northern and north-eastern parts of the island, and consequently this climate is very hot and dry. Except for an occasional heavy downpour they are practically waterless, except in the North-East monsoon when very heavy rain falls for a very limited period. Butterfly life in this region seems to be dependent very largely on the rainfall, a certain amount of moisture being required to bring the pupæ to emergence. On studying the list of butterflies it will be observed—which indeed would naturally be expected—that the very great majority of Ceylonese butterflies occur also in South India, or are very closely related forms, and no doubt the butterfly fauna of Ceylon has been almost entirely derived from Southern India. There is very little evidence of any connection, with the Malayan region; indeed, this evidence is confined, as far as we know, to three species only, *viz.*, *Danais exprompta*, Butler, *Euplœa corus*, Fabricius, and *Elymnias singhala*, Moore. *D. exprompta* is no doubt a local race of *D. similis*, Linnæus, a Chinese species, and *E. corus* is related to *E. castlenaui*, Felder, a Nicobarese and Malayan species. It is noteworthy that these two species belong to a highly protected group and are very tenacious of life. One might hazard the conjecture that the ancestors of these species were carried hither by favourable winds from the Malayan coast, succeeded in establishing themselves, and formed local races. *E. singhala* is very closely akin to *E. panthera*, Fabricius, (=*E. lutescens*, Butler,) also a Malayan species, and it is remarkable that its one locality almost is the Peradeniya Botanical Gardens, which contains numerous Malayan *Palmaceæ* (on which the larva feeds) received from that part of the world. The butterflies found only in Ceylon otherwise than local forms are very few indeed. *Danais taprobana*, Felder, is undoubtedly the most striking as it is a common and handsome insect. The most interesting butterfly in Ceylon is, probably, *Lethe dynsate*, Hewitson, as it has no allies and has a distinct subgenus to itself. It is the link in the genus *Lethe* between those species having no sexual characters on either wing and those having sexual characters on both wings. In Ceylon it is a widely distributed but apparently local insect, and may yet be found in Southern India when that country has been more fully explored. *Prioneris sita*, Felder, is a wonderful mimic of *Delias eucharis*, Drury, though its manner of flight is quite different. The mimicry cannot be accepted on the usual grounds as it is a fast-flying insect and seemingly well able to take care of itself; though manifestly it must be an immense advantage to the insect to be mistaken when at rest (when butterflies are most liable to danger from their natural foes) for an inedible species, such as *D. eucharis* is, and the mimicry is shown by the coloration and markings of the underside only, which is the surface exposed, all *Pierinæ* resting with closed wings.

A perusal of this paper will show that we have endeavoured indirectly to bring to notice the very incomplete knowledge we yet possess of this well-worked group. Among the more interesting questions to which local entomologists might well direct attention is the study of the various local forms with the allied South Indian species. The genus *Cirrhochroa*, for instance, is in an unsatisfactory state. The limits of the genus *Terias* will remain undefined indefinitely unless some entomologist will devote himself to a series of breeding experiments, which should not be difficult as the species are easily observed and reared. Our conclusions regarding the few species found in Ceylon even with Mr. Green's and Mr. Ormiston's help are yet far from complete. The genus *Aphnæus* requires much close observation before it can be definitely stated how many species occur in the Island. Mimicry does not occur to any marked degree, to nothing like the same extent as it does for instance in the Sikhim forests, where butterfly life is far more abundant and the struggle for existence all the more keen. The best examples of one species mimicing another is the female of *Hypolimnas misippus*, Linnæus, mimicing *Danais chrysippus*, Linnæus, and of the *Prioneris* mentioned above; and that of mimicing a natural object, *Kallima philarchus*, Westwood, a member of the well-known "oakleaf" genus, resembling an oak or perhaps better a chestnut leaf.

The list is largely founded on Moore's "Lepidoptera of Ceylon," vols. I and III, which is likely to be the standard work on Ceylon butterflies for some years yet to come. We have therefore noticed where the nomenclature now differs from the time, nearly twenty years ago, when Moore's work was published, and have also intimated where we have differed from Moore's determinations, so that local entomologists may bring their "Lepidoptera of Ceylon" up to date. That work enumerates 252 species; of these we have removed several as being synonyms of other species or from errors in record. We have, on the other hand, added 12, bringing the total number up to 228, and we do not think this is likely to be greatly exceeded. We have to thank many local entomologists for help most readily accorded. To Mr. F. M. Mackwood, our Nestor in the science, we are greatly indebted, as he has ungrudgingly given us the result of his many years' experience. Mr. Green of Punduloya and Mr. Ormiston of Haldummulle have given us valuable notes and a large number of specimens, and Mr. Pole of Chilaw has been most obliging in sending us notes and presenting us with considerable numbers of specimens from the more inaccessible and arid portion of the island.

Mr. de Nicéville would especially desire to bring prominently to the notice of lepidopterists in Ceylon the importance of carrying out a series of experiments in breeding butterflies of several genera occurring in the island, notably *Mycalesis*, *Cirrhochroa*, *Aphnæus*, *Terias* and *Appias*.

The food-plants of the larvæ of all these genera are well-known, without this knowledge it would be impossible to do anything in this direction. Growing examples of these plants should be enclosed in a cage of gauze or perforated zinc, the leaves having first been carefully examined to see if they bear any eggs or larvæ; if they do, these should be removed. A female of the species to be experimented with should be let loose in the cage, and it is probable that she will lay eggs. No more than one female should be put into any one cage. On her death, she should be preserved for future reference, as it is important that her identification should be certain, and also for comparison with her offspring. All the resultant butterflies from the eggs laid by one mother should be set and compared with her. It will not improbably be found that these specimens will exhibit very great variation, the variations (especially if the experiments are carried out at the change of the seasons from wet to dry or from dry to wet) including distinct seasonal forms and probably intermediate forms between the wet and dry, and very possibly one or more forms which have been considered distinct species. Cabinet naturalists from analogy may make possibly correct guesses as to what are seasonal forms and what are distinct species, but these guesses require confirmation, and certainty can only be arrived at by careful breeding.

In this paper Major N. Manders is responsible for the notes on occurrence, etc., while Mr. L. de Nicéville has revised the nomenclature, bringing it as far as possible up to date. He has followed Dr. F. Moore's "Lepidoptera Indica" as far as published (part xl), the *Lycænidæ* in vol. iii of de Nicéville's "Butterflies of India, Burmah and Ceylon," the *Papilioninæ* in the Hon. Walter Rothschild's "Novitates Zoologicæ," vol. ii, pp. 167–463 (1895), and the *Hesperiidæ* in Messrs. Elwes and Edward's paper in Trans. Zool. Soc. Lond., vol. xiv, pp. 101–324 (1897).

Family NYMPHALIDÆ.

Subfamily DANAINÆ.[*]

1. HESTIA JASONIA, Westwood.

Moore as *Nectaria jasonia*. Species of the genus have received many trivial names, such as the Sylph, the Widow, the Floater, the Spectre, and the Silver-paper-fly. It is peculiar to Ceylon, and is found in the low country, as at Labugama, 200 ft., and up to about 5,000 ft.; always in forests and in the neighbourhood of streams. It has a slow

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[*] The subfamily name should be more correctly *Danaididæ*, as it ought to be based on the genus *Danaida*, Latreille first using that name in 1805, *Danaus* in 1809, and *Danais* in 1819 (*Aurivillius*, Kongl. Sv. Vet. Akad. Hand., vol. xxxi, p. 30 (1898).

sailing flight within a few feet only of the ground, and is consequently easily captured, in this being unlike many of its allied species, which have a lofty flight over dense jungle or mangrove swamps, and are consequently rare in collections. The females are larger and usually paler than the males, but both sexes exhibit great variation in depth of colouring and extent of markings, these characters having been taken by some authors in allied species occurring elsewhere to constitute distinct species, very erroneously in our opinion. The larva still remains to be described. It will probably be found to feed on a creeper with a milky juice, the larva of the allied South Indian species, *H. lynceus*, Drury, feeding on *Aganosma cymosa*, Nat. Order *Apocynaceæ*. Mr. E. Ernest Green has sent de Nicéville a beautiful coloured drawing of the side view of a larva made by him from a specimen discovered by Mr. F. B. Armstrong, who found it in the district of Deltola feeding upon a climbing asclepidaceous plant allied to *Hoya*. It is deep velvety black, with four pairs of long filamentous tentacles from the third, fourth, sixth and twelfth segments, each pair springing from close to the dorsal line; each segment is marked with a rather broad pale yellow band, and the sixth to the twelfth segments bear laterally a large oval crimson spot; the head and legs are black. The larva is a very handsome one and is evidently warningly coloured. It probably feeds openly and must be very conspicuous.

2. DANAIS (*Radena*) EXPROMPTA, Butler.

Confined to Ceylon, and there found on the South-West littoral, no species of the subgenus occurring in peninsular or continental India. It is abundant at Galle in June and July and again in November and December; also in the jungly country between Galle and Colombo, and sparingly in the botanical gardens at Heneratgoda, but not further north than Negombo, where it is common. It used to occur in the immediate neighbourhood of Colombo, but of recent years appears to have disappeared. It is easily distinguished from the next species when on the wing by its much bluer coloration, which colour, however, rapidly fades after the death of the insect. The larva has still to be discovered.

3. DANAIS (*Tirumala*) LIMNIACE, Cramer.

Moore as *limniacæ*. Common and found almost everywhere in Ceylon; elsewhere it occurs nearly all over India, in Burma, Indo-China, and Southern China and in the islands of Formosa and Hainan. The larva feeds on *Asclepias*, *Calotropis* and *Hoya* (*Moore*), and in the Western Himalayas on *Marsdenia*.

4. DANAIS (*Tirumala*) SEPTENTRIONIS, Butler.

Occurs commonly everywhere. The larva in Ceylon does not appear to have been discovered; in the Western Himalayas it feeds on *Vallaris*. It occurs in many parts of India, Burma, the Malay Peninsula, Indo-China, and many of the Malayan Islands. Mr. H. Fruhstorfer has recently named this species from South India and Ceylon *Tirumala melissa dravidarum* (Berl. Ent. Zeitsch., vol. xliv, pp. 113, 1191—899). We do not think that this southern race of *D. septentrionis* can be separated from the northern one.

5. DANAIS (*Limnas*) CHRYSIPPUS, Linnæus.

Moore as *Salatura chrysippus*. Very common all over the island. The larva feeds on *Calotropis* and *Asclepias*. Found also in S.-E. Europe, nearly all Africa and its satellite islands, all southern continental Asia, the Loochoo Islands, and many of the western islands of the Malay Archipelago.

6. DANAIS (*Salatura*) PLEXIPPUS, Linnæus.

Moore as *Salatura genutia*, Cramer. Very common indeed everywhere. In Calcutta, de Nicéville has seen the eggs of this species laid on *Cynanchum corymbosum*, Wight, in the Western Himalayas it feeds on an allied species of the same genus, and Dr. Moore gives *Raphis*, *Ceropegea* and *Raphanus* as its food-plants in Ceylon. It is found in most parts of India, Burma, the Malay Peninsula, Indo-China, Southern China, and Hainan and Formosa Isles.

7. DANAIS (*Parantica*) AGLEA, Cramer.

Moore as *Parantica ceylonica* (recte *ceylanica*), Felder. A local race of this species is the North and Eastern Indian *D. melanoides*, Moore. In Ceylon it is an abundant and widely distributed butterfly flying nearly all the year round. The larva in South India and Ceylon feeds on *Tylophora* and *Calotropis*. Dr. Moore says that *D. grammica* of Boisduval from Java is a synonym of *D. aglea*, and that he has a single female of it from Java. *D. ceylanica*, Felder, is another synonym.

8. DANAIS (*Chittira*) TAPROBANA, Felder.

Moore as *Chittira fumata*, Butler. One of the most distinctive butterflies of Ceylon, and peculiar to the Island. It is abundant nearly all the year round in the hill country, but not below 5,000 feet, especially common in the neighbourhood of Nuwara Eliya. It has been recorded from as low as 3,000 feet. Its transformations still await discovery.

9. EUPLŒA (*Crastia*) ASELA, Moore.

This species is an insular form of the continental Indian *E. core*, Cramer. It is one of the commonest of our butterflies at all elevations, especially so in November and December when it joins in the annual flights in thousands. As it is a fairly well-marked species, and has never been recorded from any locality outside Ceylon, it would seem that the annual migrations so-called of the Ceylonese butterflies are purely local, and that the flights do not even reach to the mainland of South India by Adam's Bridge across the narrow Palk Strait. The larva feeds on *Nerium*, and probably also on species of *Ficus*.

We have removed *E.* (*Crastia*) *frauenfeldii*, Felder, and *E.* (*Crastia*) *scherzeri*, Felder, from the list of Ceylonese butterflies. Felder's original descriptions of these species are to be found in a list of the butterflies captured at the various ports at which the frigate "Novara" touched, written in 1862. *E. frauenfeldii* was said by Dr. Felder to have come from "Ceylon," and by Dr. Moore from "Trincomalee, on the N.-E. side of the island," there being a single male from thence in the British Museum. *E. schertzeri* is also said by Felder to have come from "Ceylon," and is so recorded by Moore on Felder's authority. It is de Nicéville's opinion that Felder's type specimens of both these species were wrongly located, and that they both came from the Nicobar Isles, which the "Novara" visited. If this be so, *E. camorta*, Moore, is a synonym of *E. scherzeri*. He has examined the type specimens of both *E. frauenfeldii* and *E. scherzeri* in the Natural History Museum of Vienna. As regards the specimen from Trincomalee mentioned above which has been described and figured by Dr. Moore as *E. frauenfeldii*, the identification is certainly incorrect, it being nothing less than *E. lorquinii*, Felder, originally described from South China, and very common at Hong-Kong and on the opposite mainland of Southern China. *E.* (*Crastia*) *felderi*, Butler, is a synonym of it as stated by Butler himself, though the type is said to have come from Sumatra, but it is recorded also by Butler from Hong-Kong. Felder himself in 1865 united *E. frauenfeldii* to *E. esperi*, Felder, originally described from "Kar Nicobar," saying that the type specimens are opposite sexes of one species, and the species will stand under the former name from the Nicobars, with *E.* (*Tronga*) *biseriata*, Moore, as a second synonym. As neither *E. frauenfeldii* nor *E. scherzeri* have (with the exception of the British Museum specimen of the former mentioned above) for nearly forty years been found in Ceylon, and that *Euplœas* are large, conspicuous, and very easily caught butterflies which (where they occur) are nearly always common, it is hardly possible that they can have been overlooked during all these years in a small island that has been thoroughly well worked for *Lepidoptera*. Neither is it probable that they have been exterminated, and still less probable that single immigrant specimens should have been captured on the occasion of the "Novara's" visit. The Trincomalee specimen is almost certainly wrongly ticketed.

10. EUPLŒA CORUS, Fabricius.

Moore as *Macroplœa elisa*, Butler. It is peculiar to Ceylon, on species of the subgenus being found in peninsular or continental India, though an allied species, *E. castelnaui*, Felder, occurs in the Malay Peninsula, Sumatra and the Nicobars. The Burmese form of *E. castelnaui* has recently been named *Macroplœa corus vitrina* by Fruhstorfer. In Ceylon *E. corus* is common at Galle, Labugama, and doubtless also in the intervening districts in June and July and again in November and December. Formerly it was found on Crow Island and other places in the immediate neighbourhood of Colombo. It is one of the largest butterflies of Ceylon, and from its dull brown colour, its slow flapping flight, and its love of deep shady jungle, might easily when flying be mistaken for a bat. Dr. Moore has figured the larva and pupa, but the food-plant of the former appears to be unknown.

11. EUPLŒA (*Pademma*) SINHALA, Moore.

Moore as *Isamia sinhala*. It is an insular race of the peninsular and continental *E. kollari*, Felder. Found in the low country and up to about 3,000 feet but not commonly. Manders took it once at Colombo on ground now built over. From its superficial resemblance to the common *E. asela*, Moore, it may very easily be overlooked. Its transformations are unknown.

12. EUPLŒA (*Narmada*) MONTANA, Felder.

Peculiar to Ceylon, but it has a near ally in the South Indian *E. coreoides*, Moore, which on the east coast occurs as far north as Orissa, and is a synonym of the much older *E. coreta* of Godart. *E. montana* is not uncommon at certain seasons, and occasionally migrates in great numbers with *E. asela*, Moore, of which it is a mimic in the müllerian sense, but may be distinguished from *E. asela* even in flight by its more rounded wings. It is found at all elevations, and has been taken rarely in the outskirts of Colombo, more commonly at Kandy, and abundantly at Nuwara Eliya in May. Its larva and pupa are still undiscovered.

Subfamily SATYRINÆ.

13. MYCALESIS (*Orsotriæna*) MANDATA, Moore.

A very common species in the Western and Central Provinces of Ceylon up to about 3,000 feet, in open spaces in forests and jungle. It occurs also in Southern India. *M. mandata* is the wet-season and *M. mandosa*, Butler, is the dry-season form of this species. Its transformations have been recorded, and like all the Indian *Satyrinæ* its larva feeds on rice and grasses.

14. MYCALESIS (*Calysisme*) PERSEUS, Fabricius.

Like the last, this appears under two seasonal forms, a wet and a dry, *M. perseus* being the latter, and *M. blasius*, Fabricius, the former, Moore giving them as separate species in Lep. Cey., his pl. xi, figs. 2, 2*a*, *male*, representing the wet-season form. It is a very common species up to moderate elevations, and occurs almost throughout India, Burma, the Malay Peninsula, Southern China, Hainan and Formosa Isles, and many of the islands of the Malay Archipelago, extending to the Solomon group in the Pacific Ocean. Moore describes it as having in the male on the underside of the forewing a glandular patch of scales on the middle of the submedian nervure small and *black*, and the hindwing having on the upperside a tuft of radiating *yellowish* hairs arising within the discoidal cell from behind the base of the subcostal nervure and overlapping a glandular patch of *black* scales at the base of the first subcostal nervule. The larva feeds on grass as usual.

15. MYCALESIS (*Calysisme*) POLYDECTA, Cramer.

This also has two distinct seasonal forms, *M. polydecta* being found in the dry-season, *M. justina*, Cramer, in the wet. It is omitted by Moore from his "Lepidoptera of Ceylon," but finds a place in his "Lepidoptera Indica." He describes the male as having on the underside of the forewing a small glandular patch of *blackish* scales on the middle of the submedian nervure, and on the upperside of the hindwing having a subbasal tuft of *yellow* hairs overlapping a glandular patch of *blackish* scales. In so far there appears to be but little difference between *M. perseus*, Fabricius, and *M. polydecta*, black and blackish, yellow and yellowish. But he goes on to say that "Individuals of the dry-season brood [it should be broods, as more than one brood of each seasonal form occurs in the year] of *C. polydecta* are distinguishable from those of the dry-season brood of *C. perseus* by the large pale-bordered ocellus on the upperside of the forewing, and in the hindwing of both sexes having a scalloped exterior margin, which latter is very prominent in most of the females." He notes that the wet-season brood of *M. polydecta* has "a moderately large distinctly-formed median ocellus with a yellowish outer ring (much larger than in the males of the wet and dry-season brood of *M. perseus*), the surrounding area being slightly tinged with ochreous" on the upperside of the forewing. His figures of both sexes of both species bear out this distinction between them. But we have grave doubts that this solitary and unimportant character really denotes two distinct species. Breeding alone can solve the question, though a critical examination of the prehensores of the male might go to prove the matter one way or the other. *M. polydecta* appears to occur almost everywhere in India with *M. perseus*, which is another disquieting feature. It is quite common in Ceylon. The wet-season form is figured in Lep. Cey., pl. xi, figs. 3, 3*a*, *male*, as *Calysisme drusia*, and again the same form on the same plate, figs. 4, 4*b*, *male*; 4*a*, *female*, as *C. mineus*: the dry-season form is given on pl. xii, figs. 1, 1*a*, *male*, as *C. perseus*. The true *M. mineus*, Linnæus, given originally by Moore from Ceylon, is now restricted by him to Northern and Eastern India, Burma, Siam and S.-E. China. Dr. Moore confines the occurrence of *M. polydecta* to India. It has not been bred.

16. MYCALESIS (*Calysisme*) SUBDITA, Moore.

This species has recently been described by Dr. Moore from South India and Ceylon. The male has on the underside of the forewing a [large] elongated glandular patch of *ochreous-yellow* scales upon the submedian nervure extending from its middle to the discal pale band; and on the upperside of the hindwing a subbasal tuft of *pale* hairs exserted or overlapping a glandular patch of *ochreous-yellow* scales. In the dry-season form Moore describes the scales as *yellow* instead of ochreous-yellow. The large size as well as the colour of the patch of scales described above on the forewing will readily distinguish the males of this species from the two which have preceded it. Dr. Moore records it from Trincomali in August, October and November, but it is doubtless quite common throughout Ceylon all the year round and only awaits recognition. Its transformations have not been recorded.

17. MYCALESIS (*Calysisme*) RAMA, Moore.

Calysisme rama, Moore, Lep. Ind., vol. i, p. 196, pl. lvii, figs. 3, 3*a*, *male, wet-season form* (1892).

"MALE. UPPERSIDE, *both wings* olivescent ochreous-brown, marginal lines indistinct. *Forewing* with a distinct transverse medial discal line, and a large prominent median black ocellus with a white pupil and narrow ochreous-yellow outer ring, above which is a very minute subapical ocellus between the discoidal nervules. *Hindwing* with a less distinct small ocellus between the second and first median nervules, a subbasal tuft of *yellow* hairs overlapping a small glandular patch of dark brown scales extending below the first subcostal nervule and surrounded by the ordinary nacreous costal area. UNDERSIDE, *both wings* pale ochreous-brown, palest externally; marginal lines distinct; with a moderately broad pale ochreous-yellow transverse discal fascia, the inner border of which is sharply defined by a dark brown line, the outer border being diffused. *Forewing* with a small prominent subapical and a large median ocellus; and with a small glandular patch of *dull brown* scales on the middle of the submedian nacreous area. *Hindwing* with seven ocelli, the upper second and third, and the seventh minute and almost obsolete, the other four prominent. *Body* beneath, *legs*, and sides of *palpi* pale ochreous; club of *antennæ* blackish and tipt with ochreous. EXPANSE: 1·87 inches."

"A single specimen of the male of this species (presumably of the wet-season brood) taken at Udagama, in the West Central District of Ceylon by Mr. Reginald Poole, and now in the collection of Mr. E. E. Green, is all that is yet known to the author." (*Moore*, l.c.).

Mr. John Poole has sent a single male of this species to de Nicéville to see, taken at Udagama. Before anything definite can be said about this supposed new species, much more must be known about it than can be ascertained from a couple of specimens.

With regard to the *Calysisme* group of the genus *Mycalesis*, Manders writes:—"I have through the kindness of Mr. Ormiston and others been able to examine a large series of specimens from Ceylon, and I find as a result that though it is easy to separate typical examples of each it is impossible to draw any hard and fast line between the seasonal forms; and further I am in some instances unable satisfactorily to discriminate the species; there are certain specimens which are intermediate between *M. perseus* and *M. polydecta*." Further, Manders has compiled the following note on the appendages of the males of the subgenus:—"The yellow hair-like processes on the upperside of the hindwing of *M. perseus* and *M. polydecta* are situated immediately behind the subcostal nervure at its origin. They arise almost in a bunch between the scales of the wing, and pass forwards and outwards in a fan-shaped manner to the oval depressions about to be described. They are structureless and solid throughout (as examined under $\frac{1}{12}$ oil immersion lens magnifying 950 diameters), they gradually taper to a point, and are probably chitinous in composition. The oval depressions alluded to above are two in number, one situated on the submedian nervure of the forewing on its underside, the other partly below but more largely above the subcostal nervure of the hindwing on its upperside. In *M. perseus* and *M. polydecta* these depressions are black, and are due to very closely imbricated scales with *evenly* rounded ends. That these spoon-shaped structures are depressions of the wing-surface is evident from the fact that all the scales are not in focus at the same time. In some specimens of *M. perseus* and *M. polydecta* these depressions are darkly iridescent, and under the microscope are seen to be composed not only of black scales, but also many of a deep steel, and others again of a lighter blue colour, changing their depth of colouring according to the direction of the light thrown on them. The scales under 950 diameters shew very minute striation, but in all cases the ends are *evenly* rounded. These rounded scales resist the action of solvents such as *eau de juvalle* much more strenuously than the scales on other parts of the wing. There is no true glandular structure whatever; but it is noteworthy that only the ends of the yellow "hairs" rest in the oval depressions. There is nothing in the structure of these appendages to indicate their function, nor do I think that they are used for stridulating purposes, as in that case I should have expected to find that the scales and hair-like processes would be toothed in some way so as to produce sounds, but this is not the case."

18. MYCALESIS (*Nissanga*) PATNIA, Moore.

Peculiar to Ceylon; but a closely-allied species, *M. junonia*, Butler, occurs in South India. It is in Ceylon a widely distributed and common insect, ascending to considerable elevations, being particularly common about Kandy. It is strongly seasonally dimorphic; the rains form being very dark, especially on the under surface. It has never been bred.

19. LETHE (*Hanipha*) DYNSATE, Hewitson.

Moore as *H. sihala*, Moore, and *H. dynsate*, of the former he described both sexes in the Lep. Cey., of the latter the female only, but united them under one species in Lep. Ind. It is not only rare but is one of the most interesting of Ceylonese butterflies, and is confined to the island. The sexual patch of hairs on the forewing of the male on the upperside is unique, the subgenus *Hanipha* being confined to a single species. The white subapical band on the forewing of the female is variable in width, specimens from the hills having it narrower than specimens from the low country. It is found in the South-West portion of Ceylon at Awisawella and Udugama in the low country in July, and at Haputale, 5,000 feet, and Ohiya, 6,000 feet, in the hill country. It has also been taken in the Maskeliya district by

Mr. E. E. Green. Dr. Moore records it from near Nuwara Eliya in March and April, and at Punduloya in July. Its transformations are unknown. Like all *Lethes*, the larva probably feeds on bamboo or grasses.

20. LETHE DRYPETIS, Hewitson.

Moore as *L. drypetes* [sic] in Lep. Cey. and Lep. Ind. Occurs also in South India (as *L. todara*, Moore). In Ceylon it is not uncommon amongst bamboos, on which the larva feeds, at 3,000 feet and upwards. It is common in Punduloya in suitable localities, and Manders has taken it in May in the Hakgala Gardens below Nuwara Eliya.

21. LETHE NEELGHERRIENSIS, Guérin.

Moore as *neelgheriensis* in Lep. Ind. Common in the middle hill districts of Ceylon, more particularly perhaps along roads leading through tea estates. It is found also in Southern and Central India, and is closely allied to the North Indian *L. rohria*, Fabricius = *L. dyrta*, Felder. Dr. Aurivillius has named the *L. dyrta* of authors *L. confusa* (Ent. Tids., vol. xviii, p. 142, n. 15—1897). Mr. E. E. Green says that the larva feeds on grasses.

22. LETHE DARETIS, Hewitson.

Peculiar to Ceylon, and very common at high elevations. It is one of the few butterflies found on the Horton Plains, 7,000 feet. It is abundant nearly all the year round at Nuwara Eliya, the females being more frequently noticed than the males from their habit of flying closer to the ground. The males, unlike the majority of the genus, are fond of settling on the upper branches of low jungle trees, and flying rapidly in the sun round the topmost branches. Its transformations are unknown.

23. YPTHIMA SINGALA, Felder.

Moore as *Y. singala* and *Y. thora*, Moore. Through the kindness of Mr. Ormiston, Manders has examined thirty specimens of this insect from the Haldummulle district, 1,500-3,500 feet, and from the Bandarawella district, 5,000 feet, and finds very great variety amongst them. The males are more frequently spotless on both wings on the upperside; but sometimes have a more or less conspicuous ocellus at the anal angle of the hindwing, and a more conspicuous, larger external ocellus is not infrequent; very rarely there is a third small ocellus external to this. In two specimens the forewing has a small subapical bipupilled ocellus, this being the *Y. thora* of Moore. The females are more constant on the upperside. The underside of both sexes is very variable, the upper ocellus of the hindwing is the one usually wanting. In one specimen there are four ocelli on one wing and five on the other. The species is widely distributed, and is not uncommon on grassy slopes in the middle hill districts. Dr. Moore restricts it to Ceylon, but it certainly occurs in many parts of India also. It is strongly seasonally dimorphic. Its transformations are unknown.

24. YPTHIMA CEYLONICA, Hewitson.

The pure white patch on the upperside of the hindwing of this insect renders it one of the most conspicuous and easily distinguishable species in the genus. It is very common in the low country, particularly so in the Cinnamon Gardens at Colombo, fluttering about amongst the grass on the roadsides nearly all the year round. It is found in South India, and on the east coast as far north as Orissa. It has never been bred.

25. MELANITIS ISMENE, Cramer.

Moore as *M. ismene*, and *M. leda*, Linnæus. The wet-season form of this species is *M. determinata*, Butler; the dry-season form is true *M. ismene*. The true *M. leda*, Linnæus, usually understood to be the wet-season form of *M. ismene*, is now said by Drs. Butler and Moore to be a distinct species from Amboina. *M. ismene* is very common in Ceylon and is widely distributed. Its range in Africa, Asia, Malaya, Australasia and the South Seas is very great. It has been frequently bred on rice and grasses.

26. MELANITIS TAMBRA, Moore.

Dr. Moore in Lep. Indica describes and figures dry and wet-season forms of this species, and restricts it to Ceylon. He also describes the larva and pupa but does not give its food-plant, though that is almost certain to be the same as for *M. ismene*, Cramer. It is very close indeed to *M. bela*, Moore, restricted by the describer to the Himalayas, Assam, the Naga and Khasi Hills and Burma. If really distinct, which we doubt, size alone would appear to distinguish between them, *M. tambra* being the smaller. *M. tambra* probably occurs all the year round, and has been recorded from the Western and Central Provinces, in the plains and up to 3,000 feet elevation; from Punduloya, Ramboda and Kandy (*Moore*), Manders records it from the Hambantota district. Dr. Moore gives *M. varaha*, Moore, from South India, which is also doubtfully distinct from *M. bela*. *M. suyudana*, Moore, the describer restricts to the Malay Peninsula, Sumatra, Nias and Java; *M. abdullæ*, Distant, Dr. Moore gives from the Malay Peninsula; and there are doubtless other named forms of *M. bela* which have been described from more distant localities. As *M. ismene*, Cramer, is admitted to have a wide range, it is more than probable, we think, that *M. bela* is also widely spread.

Subfamily ELYMNIINÆ.

27. ELYMNIAS FRATERNA, Butler.

This is the Ceylonese form of the continental Indian *E. undularis*, Drury, the females of the two species being indistinguishable. It is common in Ceylon in the low country, and is found usually in jungle in the neighbourhood of water. The males are fond of settling on the stems of *Caladium*, which make them somewhat conspicuous in spite of their dull-coloured under-surface. The female is totally unlike the male, and bears a strong superficial resemblance to *Danais plexippus*, Linnæus, which it doubtless mimics. The larva is well known and feeds on *Palmaceæ*.

28. ELYMNIAS (*Melynias*) SINGHALA, Moore.

Moore as *Melynias singala* in Lep. Ind. It is somewhat close to, though quite distinct from, *E. lutescens*, Butler, from the Malay Peninsula, Sumatra and Borneo, which is probably a synonym of *E. panthera*, Fabricius, though the latter is kept by Moore as a distinct species from Java. Moore places *panthera* in the genus *Elymnias* and *singhala* in the genus *Melynias*. Mr. F. M. Mackwood informs us that up to quite recently the Peradeniya Botanical Gardens near Kandy was the only locality for *E. singhala*, and it is abundant there, but it is apparently gradually extending its range. It appears to be quite constant, and is confined to Ceylon. Moore suggests that it mimics *Euplœa sinhala*, Moore. The transformations are unknown, but Mackwood says that the larva feeds on the leaves of a species of palm tree.

Subfamily AMATHUSIINÆ.

29. DISCOPHORA LEPIDA, Moore.

Restricted to South India and Ceylon, and apparently always rare. In South India it is strongly seasonally dimorphic. In Ceylon it is found in the low country jungles on the east and west of the island; we have specimens from Awissawella and the forests near Galle; Mackwood obtained a single specimen in Ambegamoa. The transformations have been described, and, as usual in the genus, the larva feeds on bamboo.

Subfamily NYMPHALINÆ.

Dr. Moore divides the subfamily into eight groups, *Charaxina*, *Potamina* (*Apaturidæ*, auctorum), *Euthaliina*, *Limenitina*, *Nymphalina*, *Argynnina*, *Melitæina*, and *Eurytelina*. As far as we can we have followed him, but up to date several of his groups have not been reached in Lep. Ind.

Group *Charaxina*.

30. CHARAXES PSAPHON, Westwood.

The Hon. Walter Rothschild in Novitates Zoologicæ, vol. v, p. 545 (1898) has commenced a paper entitled "A Monograph of *Charaxes* and the allied prionopterous genera," but as two parts, which have alone been published up to the present date, only include one species from Ceylon, we are only able to follow him so far. He says the type of *Charaxes* is *jason*, Linnæus, and of *Eulepis* is *samatha*, Moore. He admits three other genera, *Euxanthe*, *Palla*, and a new genus, the types of these being *eurinome*, Cramer, *decius*, Cramer, and *trojanus*, ? author. The two first would appear to contain our Ceylonese species.

In Lep. Cey. Moore gives *Haridra psaphon*, Westwood, male only, and *Haridra serendiba*, Moore, female only, these two names representing opposite sexes of one and the same species. It is confined to Ceylon, but has a close ally in the South Indian *C. imna*, Butler. It is not very rare near Kandy, and Moore records it from Trincomali, Kottawa, Awissawella and Kanthalla. It may be useful to collectors to note that toddy or rum and sugar spread upon tree trunks in the haunt of *Charaxes* and *Euthalias* often proves a very successful bait. The female is very rarely met with. The transformations of *C. psaphon* are unknown.

31. CHARAXES FABIUS, Fabricius.

Abundant on the North Central Road and low forest land generally in that Province, but not reaching the middle hill district. It is found in many parts of India and in Burma. Its transformations are well known, and the larva feeds on the tamarind tree, *Tamarindus indica*.

32. EULEPIS ATHAMAS, Drury.

Moore as *Eulepis samatha*, Moore, and sunk by him in Lep. Ind. as a synonym of *E. athamas*. Rothschild in Nov. Zool., vol. vi, p. 249 (1899) records it from Ceylon as "*Eulepis athamas agrarius* f. (temp. ?) *madeus*, Rothschild." Not at all rare in jungle in the lower hill district. It is very common in the neighbourhood of Kandy at the beginning of the South-West Monsoon and at the end of the year. Rothschild restricts this particular form of *E. athamas* to the Central Provinces of India, South India and Ceylon. The parent form, true *E. athamas*, he gives from N.-W. India to Southern China, Burma, the Malay Peninsula, and Indo-China. Its transformations have been frequently recorded.

Group *Potamina.*

33. POTAMIS (*Rohana*) CAMIBA, Moore.

This species is confined to Ceylon and Southern India, to the northwards being replaced by *P. parysatis*, Westwood, that species being found in the Himalayas, Assam, Burma, Indo-China and Southern China. It is widely distributed in Ceylon from the low hill country upwards, and the males are not uncommon; the female, as in the genus generally, is much less commonly seen, and is a good mimic of species of *Ergolis*. The larva and pupa have been described and figured.

Group *Euthaliina.*

34. PARTHENOS CYANEUS, Moore.

Confined to Ceylon, replaced in South India by *P. virens*, Moore. *P. cyaneus* is found at all elevations, is not rare, but is difficult to catch. It has a remarkably distinctive mode of flight, which makes it recognizable at once on the wing. It flies in May, June and July, and again in November and December. Moore describes and figures its early stages.

35. SYMPHÆDRA NAIS, Forster.

Found on the eastern side of the island near Trincomali, and in the grassy country near Haldummule from 500 to 2,000 feet elevation, commonly in November and December. In India it is widely distributed. Its larva feeds on *Diospyros*, Nat. Order *Ebenaceæ*, and on Sãl (*Shorea robusta*).

36. EUTHALIA (*Dophla*) EVELINA, Stoll.

Restricted to Ceylon, replaced in South India by the closely-allied *E. laudabilis*, Swinhoe. Common in the jungles in the low country in the North Central Province, probably throughout the year in greater or less abundance. On one occasion Manders counted thirty of these butterflies sucking up the sap flowing from a tree in the jungle near Mahintale in August. It occurs also in the forests near Galle and Labugama. Its transformations are unknown. The larva will probably be found on *Diospyros*.

37. EUTHALIA LUBENTINA, Cramer.

Found in Ceylon not commonly in the thick forests between Dambool and Anaradhapura, and Dambool and Trincomali. It occurs in many parts of India, in Burma, the Malay Peninsula, Indo-China and Sumatra. The females are more frequently met with than the males. Its transformations are known, the larva feeding on *Loranthus*.

38. EUTHALIA GARUDA, Moore.

Not so common as the next, but found in the same localities. Mackwood got it at 3,000 feet elevation, and Yerbury at Peripancherakullam on the Kandy Road; Manders at Heneratgoda. It occurs nearly all over India, in Burma, the Malay Peninsula, Indo-China, Sumatra, Java, and Borneo, the form from the three last-named islands being probably the *E. sandakana* of Moore. The larva and pupa are well known, the former feeding on plants of many orders, but more especially on the mangoe.

39. EUTHALIA VASANTA, Moore.

Found only in Ceylon, and very common in the low country, especially so about gardens in Colombo in June and July, and again from October to December. The transformations are known, the larva, like that of *E. garuda*, Moore, feeding on mangoe leaves.

Dr. Moore in Lep. Cey., vol. iii, p. 529 (1887) records *E. puseda*, Moore, from Ceylon from specimens in the British Museum. In Lep. Ind., vol. iii, p. 99 (1897) he records *Cynitia puseda* from the Malay Peninsula only. It can hardly occur in Ceylon.

Group *Limenitina*.

40. LIMENITIS (*Moduza*) CALIDOSA, Moore.

Moore as *M. calidasa*. Confined to the Inland, and a local race of *L. procris*, Cramer, from India and Burma. In Ceylon it is not rare in the jungles of the lower hills. The transformations have been described and figured.

41. NEPTIS JUMBAH, Moore.

Moore or *N. jumba* in Lep. Cey., and *Andrapana jumbah* in Lep. Ind. Common in the jungles in the North Central Province, but not extending into the lower hill district. Manders has taken it at Anaradhapura, Mahintale and Dambool in August; it also occurs in many parts of India, Burma, in the South Andaman and Maldive Isles. It is a well-marked and easily-recognized seasonally dimorphic species; and its transformations have been recorded.

42. NEPTIS VARMONA, Moore.

Moore as *N. varmona* and *N. disrupta*, Moore. A common low country insect which is seasonally dimorphic; occasionally the melanic aberration *N. disrupta* is met with. Dr. Moore says that the dry-season forms have been named *N. kamarupa*, Moore, and *N. eurymene*, Butler, and the wet-season forms are typical *N. varmona*, and *N. swinhoei*, Butler. It is widely spread in India, and its transformations are well known.

43. NEPTIS (*Rahinda*) SINUATA, Moore.

A common species at low elevations, but found in the hills up to an elevation of 300 feet. It has a near ally in *N. hordonia*, Stoll, from India, Burma, the Malay Peninsula, Indo-China, Sumatra, Java, Borneo, Banka, Bali, Lombok, Sumba and Sambawa. Its larva and pupa are unknown.

Group *Nymphalina*.

44. JUNONIA IPHITA, Cramer.

Moore as *Precis iphita*. Abundant everywhere in Ceylon, and occurring nearly all over India, and in Burma, the Maldive Isles, the Malay Peninsula, and many of the islands in the Malay Archipelago as far as New Guinea and in New Ireland in the Pacific, also in China and Hainan Island, and wherever found varies considerably in the depth of its colouring owing to seasonal causes. Its larva and pupa have been described.

45. JUNONIA ATLITES, Linnæus.

Moore as *Precis laomedia*, Linnæus. A common low country insect in Ceylon, found also in India, Burma, the Malay Peninsula, the Nicobar Isles, Indo-China, probably Southern China, Hainan Isle, and nearly throughout the Malay Archipelago. It has often been bred.

46. JUNONIA ORITHYIA, Linnæus.

Moore as *J. orithya*. This name was first spelt *oritya* by Linnæus, but *orithyia* is classically correct. Abundant, more especially in the low country, but not uncommon at Nuwara Eliya. Occurs almost all over India, Burma, Southern China, Formosa, and probably in Indo-China. Its larva and pupa have long been known.

47. JUNONIA HIERTA, Fabricius.

Moore as *J. œnone*, Linnæus. Scarce in Ceylon, and only found in the hottest and driest parts of the island. It occurs all over India, in

Burma, in the Andamans and Nicobars, Southern China and Hainan Island. In India it has often been bred.

48. JUNONIA LEMONIAS, Linnæus.

Not so abundant in Ceylon as *J. atlites*, Linnæus, and found in the same regions. Occurs also throughout India, Burma, the Malay Peninsula, Indo-China, Southern China, Formosa, Hainan, the Philippines, and has been recorded from Japan. Transformations known.

49. JUNONIA ALMANA, Linnæus.

Moore as *J. asterie*, Linnæus, which is the wet-season form, while true *J. almana* occurs in the dry-season. It is abundant in the low country. Found all over India, Burma, the Malay Peninsula, in the Andamans and Nicobars, China, Formosa, Hainan, Japan, Sumatra, Java, Borneo, Bali, and the Philippines. Its transformations are well known.

50. CUPHA PLACIDA, Moore.

The Ceylon insect is a good local race of the Indian *C. erymanthis*, Drury, in South India the two species gradually merge into one another. Mr. Fruhstorfer in Berl. Ent. Zeitsch., vol. xliii, p. 198 (1898) has described the form from South India intermediate between true *C. erymanthis* and *C placida* as *C. erymanthis maja*. This form cannot in our opinion rank even as a subspecies, as it is not constant to locality. In Ceylon *C. placida* is widely distributed but not abundant, more common in the low country, found rarely at Nuwara Eliya, in jungle near water, and is not easy to capture in good condition. Its transformations have been described, the larva feeds on *Flacourtia*.

51. CETHOSIA NIETNERI, Felder.

Peculiar to Ceylon, replaced in Southern India by the allied *C. mahratta*, Moore. Very common in the low hill country round Kandy, rarely met with at Colombo in June and July. Its handsome larva and pupa are well known.

52. CYNTHIA ASELA, Moore.

Peculiar to Ceylon, replaced in South India by the closely-allied *C. saloma*, de Nicéville. In Ceylon it is locally common in the low country and the middle hill districts. As usual in the genus, the female is much less commonly seen than the male, and on the wing may be mistaken for *C. nietneri*, Felder. It is generally found in thick jungle near water. Its transformations have been recorded.

53. CIRRHOCHROA THAIS, Fabricius.

54. CIRRHOCHROA LANKA, Moore.

55. CIRRHOCHROA COGNATA, Moore.

56. CIRRHOCHROA SWINHOEI, Butler.

It is impossible in the present state of our knowledge to be at all certain, much less dogmatic, as to how many species of *Cirrhochroa* exist in South India and Ceylon. From the other species of *Cirrhochroa* found in North-East India all of them can be at once distinguished by their smaller size and deep ferruginous colour, except *C. swinhoei*, Butler, which is more ochreous. According to Moore, *C. thais* occurs in Ceylon, but de Nicéville states in Butt. Ind. that the description given by Fabricius applies best to *C. thais* from Southern India, and that the Ceylonese *C. cognata* is a local race of it. In a similar way *C. lanka* is a local race of the South Indian *C. relata*, de Nicéville. *C. swinhoei* is not given by Moore as occurring in Ceylon, but de Nicéville states that he has specimens from thence. This is a problem to which local entomologists should turn their attention and endeavour to solve by breeding the various species, and by examining a large number of specimens from as many localities in Ceylon and Southern India as possible. They occur all over Ceylon, from sea-level to 6,000 feet elevation. The imagines are probably seasonally dimorphic, which will account for their vagaries in coloration and markings. The transformations of *C. cognata* have been described, but no food-plant is recorded. In South India *C. thais* has been bred on *Hydrocarpus wightiana*.

57. HYPOLIMNAS BOLINA, Linnæus.

We omit *Apatura jacintha*, Drury, recorded as a distinct species by Moore from Ceylon, as it is in our opinion not distinct from the parent form. *H. bolina* is common everywhere in Ceylon and almost throughout Southern Asia, Malayana, Australia to the Pacific. Its transformations are well known.

58. HYPOLIMNAS MISIPPUS, Linnæus.

The female of this species is totally unlike the male and exists in two forms, the first being the *Papilio diocippus* of Cramer, a perfect mimic of *Danais chrysippus*, Linnæus, and is by far the more common of the two; the second is the *Papilio inaria* of Cramer, a mimic of *Danais dorippus*, Klug, and is distinctly rare. It is curious that it should occur in Ceylon at all, as *D. dorippus* is not found in the Island, being confined in India to the western littoral (Bombay, Kutch and Sind).

H. misippus is found in Ceylon in the low country in September, but is not abundant. It is very widely spread, occurring even in North America, nearly all over Africa, in Southern Asia, Malayana, and Australia, also in many oceanic islands. Its transformations are well known.

59. PYRAMEIS CARDUI, Linnæus.

This cosmopolitan butterfly is found everywhere in Ceylon commonly. Its earlier stages have been recorded for centuries.

60. PYRAMEIS INDICA, Herbst.

The Ceylon form of this species, which also is found in Southern India, has, quite unnecessarily we think, been named by Mr. Fruhstorfer in Ent. Nach., vol. xxiv, p. 61 (1898), *P. indica nubicola*. In Ceylon it is found only at high elevations such as Nuwara Eliya and the Horton Plains, where it is not uncommon. It is more plentiful in some seasons than in others, and flies throughout the year. It occurs in Madeira, the Canary Isles, Southern Europe, the Himalayas, Assam, Northern Burma, China, Corea, Japan, Formosa, the Philippines, and M. Oberthür has recorded it from Australia. Its transformations have been recorded.

61. VANESSA HARONICA, Moore.

A local race of the Indian *V. canace*, Linnæus; found also in Burma, the Malay Peninsula, China, Corea, Japan and Hainan Island. Not uncommon in the upper and middle hill districts of Ceylon, occasionally found at much lower elevations, and nearly all the year round. Its larva and pupa are known.

62. KALLIMA PHILARCHUS, Westwood.

Found only in Ceylon. It occurs locally common at Kandy, Kurunegalla, Haldummulle, and Ratigalla amongst other places in July and again in November and December. It is strongly attracted by old beer casks, toddy, decaying fruit, and "sugaring" the tree trunks with sugar and rum or with toddy, all of these are a sure bait if used where the butterfly is found. *K. mackwoodi*, Moore, from Ceylon, is not distinct from *K. philarchus*, that species varying much in the depth of colouring and the number and position of the hyaline spots on the forewing. On the underside it is extremely variable, some specimens having a pale grey ground-colour, others a deep red, and so on. It is almost a perfect mimic of a dead leaf when at rest with its wings folded. It has not been bred in Ceylon, but the larva of the allied *K. wardi*, Moore, in South India feeds on *Strobilanthes*.

63. Doleschallia polibete, Cramer.

Moore as *D. bisaltide*, Cramer. Not uncommon in the jungles at the foot of the hills, occurring also in South India; found again in the Eastern Himalayas, Assam, Burma, the Andaman and Nicobar Isles, and in several of the islands of the Malay Archipelago. It varies greatly on the under surface. Two or three specimens have been taken at Nuwara Eliya, they were probably non-resident. Its transformations are well known.

Group *Argynnina*.

64. Argynnis hyperbius, Linnæus.

Moore as *Acidalia niphe*, Linnæus. Very common in the upper and middle hill districts wherever the genus *Viola* is found, on which plants the larva feeds; particularly numerous about Nuwara Eliya and on the Horton Plains, stragglers being occasionally found in the low country. It flies nearly all the year round. In India it is very widely spread, occurring also in Abyssinia, the Maldive Isles, Northern Burma, China, Formosa, Japan, Sumatra, and the Philippine Isles. Dr. C. Aurivillius has recently pointed out that *Papilio hyperbius*, Linnæus (1763) is an older name than *P. niphe*, Linnæus (1767).

65. Atella phalantha, Drury.

Moore as *A. phalanta*. Common everywhere in Ceylon but not abundant. It occurs also commonly nearly throughout India, where its early stages have frequently been studied. Found also throughout Africa and its satellite islands, in Burma, the Malay Peninsula, Indo-China, China, Hainan, Sumatra, Nias, Java, Bali, Lombok, Celebes, Sumba, Sambawa, Flores, Letti and Kisser.

Group *Eurytelina*.

66. Ergolis taprobana, Westwood.

Confined to South India and Ceylon. Common all the year round in the low country and up to 6,000 feet. Its transformations have been recorded from Southern India. The larva feeds on the leaves of *Tragia involucrata*, and the castor-oil plant.

67. Ergolis ariadne, Linnæus.

Moore as *E. minorata*, Moore. Common in the low country and up to 2,000 feet; above this elevation it is rare. It occurs all over India and has been often bred, the larva feeding on *Tragia*. *E. ariadne* occurs also in Burma, the Malay Peninsula, Indo-China, Formosa, Hainan, Sumatra, Java, Borneo, Bali, Banka, Lombok, Billiton, Celebes, Sambawa, Sumba, Flores, Alor, and Kalao.

68. Byblia ilithyia, Drury.

Common in the low jungles in the north of the island in July and December. It is found also in South and Western India as well as in Africa and Arabia, and is everywhere strongly seasonally dimorphic. The larva feeds on the leaves of *Tragia*.

Subfamily Acræinæ.

69. Telchinia violæ, Fabricius.

An abundant species in the low country all the year round. Common also in India. Its transformations are well known, the larva feeding on *Modecca*.

Family LEMONIIDÆ.

Subfamily Libythæinæ.

70. Libythea myrrha, Godart.

Not hitherto recognized from Ceylon, but there are one or two specimens from thence in Mr. Mackwood's collection, and one in that of Manders. These came probably from the neighbourhood of Kandy, where doubtless it is not rare though generally overlooked. It occurs almost throughout India, the larva feeding on *Celtis*. Mr. Fruhstorfer in Berl. Ent. Zeitsch., vol. xliii, p. 169 (1898) records true *L. myrrha* from Sumatra, Java, Bali, Lombok, Borneo, and Sambawa, and *L. myrrha sanguinalis*, Fruhstorfer, from the Himalayas and Malay Peninsula. Besides the localities for *L. myrrha* given above, it is found in Indo-China, Western China, and Sumba.

71. Libythea rama, Moore.

Very common at the higher elevations. Manders notes that he is inclined to think from the small material at his disposal that typical *L. rama* is found from about 5,000 feet upwards and gradually merges into *L. myrrha*, Godart, in the lower country; in this de Nicéville concurs. It is found also in South India, and Watson has recorded it from the Chin Hills of Upper Burma, 5,000 feet. It has never been bred.

72. Libythea lepita, Moore.

Not before recorded from Ceylon and apparently hitherto overlooked by collectors, though it is a well-marked and easily-recognised species owing to the ferruginous tentpeg-shaped marking in the discoidal cell of the forewing. Mr. Mackwood has three or four specimens in his collection, and Manders several, all taken in the low country. It is found in India, very rarely in the south, more commonly in the north. It occurs also in Upper Burma, China and Japan. Its transformations are unknown.

Subfamily NEMEOBIINÆ.

73. ABISARA PRUNOSA, Moore.

A local race of *A. echerius*, Stoll, from South China, differing only therefrom in its deeper coloration. Individuals vary greatly in size. In Ceylon it is common in the low country in June and July and again in November and December. It occurs also in South India, and has been bred there on *Embellia*; in Ceylon the larva feeds on *Ardisia*.

Family LYCÆNIDÆ.

74. NEOPITHECOPS ZALMORA, Butler.

Moore as *Pithecops dharma*, Moore. There is a great difference between the rains and dry-season forms of this species, the former is almost white on the underside, the latter numerously speckled with fuscous spots. It is a common low country insect in Ceylon, and is very widely spread in Southern Asia. In South India the larva feeds on the leaves of *Glycosmis*.

75. SPALGIS EPIUS, Westwood.

Not uncommon in Ceylon but local, and found in the low country. Manders has taken it once at Colombo, but it is common a few miles out at Rambukhan. The difference in the outline of the apices of the forewing of the two sexes is noteworthy, that of the male being very acute, that of the female rounded. The transformations of this species as given by Moore in Lep. Cey. are incorrect, the larvæ and pupæ figured being that of some other lycænid, probably that of *Rathinda amor*, Fabricius (No. 132). The larva is carnivorous; the pupa is very remarkable, as it presents the appearance of a minute monkey's head. It is found in many parts of India, in Burma, Java, Bali, Borneo, Sumba, Sambawa, and Damma Islands.

76. MEGISBA MALAYA, Horsfield.

Moore as *M. thwaitesi*, Moore. This is an interesting species as it occurs in a tailed and a tailless form, the former not being found in Ceylon, though the commoner of the two forms elsewhere in Asia. Like

Neopithecops zalmora, Butler, it is variable as regards the extent of the white central area of the forewing. In Ceylon it is a common low country insect, and is often found in company with the two preceding species. Its has a wide range in Southern Asia, occurring in Malaya as far east as New Guinea, and in the islands of the Pacific. It has been bred in Ceylon, the larva feeding on *Sapindaceæ*.

77. CHILADES LAIUS, Cramer.

Moore as *C. varunana*, Moore. Seasonally dimorphic, Moore's name applies to the wet-season form. It is a widely distributed insect in Ceylon, India, China, and in Hainan and Formosa Islands, in the former island being found at all elevations, and is usually abundant at Nuwara Eliya in November, the specimens then being of the rains' form. Manders notes that he has not yet met with the dry-season form in Ceylon, though no doubt it occurs there. The larva feeds on *Citrus*.

78. CHILADES TROCHILUS, Freyer.

Moore as *C. putli*, Kollar. Dr. Moore gives as localities Kandy and Trincomali, and states that it is rare. It occurs not uncommonly at Colombo in June, August and November, but from its very small size and dull coloration may easily be overlooked. Found also at Labugama in November and December. It is found from Europe to Australia and in Africa. The larva feeds on *Heliotrŏpium strigosum*, Willd.

79. CYANIRIS AKASA, Horsfield.

Not uncommon in the neighbourhood of Nuwara Eliya in May and November, always near water; also in the Punduloya district, and doubtless elsewhere in the hill country. It is found also in the hills of South India and in many of the islands of the Malay Archipelago (Sumatra, Java, Bali, Lombok, Celebes and Sambawa). It has never been bred.

80. CYANIRIS PUSPA, Horsfield.

Moore as *C. lavendularis*, Moore. A species widely distributed over India and Malaya, and much subject to seasonal variation. Rare at Colombo, more common in the middle hill districts of Ceylon. The larva feeds on *Xylia* and *Cylista* in South India.

81. CYANIRIS SINGALENSIS, Felder.

Originally described from Ceylon from specimens taken at "Kallupahane, about 3,000 ft., on 15th December." Rare at Kandy, not uncommon in the hill districts, particularly so near Nuwara Eliya in May and November. Usually flies over the tops of bushes overhanging hill streams, and is consequently difficult to capture. The females are much scarcer than the males and keep more to the jungle. It is found also in the Nilgiri Hills of South India, but has never been bred.

82. CYANIRIS LANKA, Moore.

Peculiar to Ceylon. Very common in the upper hill districts nearly all the year round, and the males may be seen in numbers settled on damp spots on the roads. The females are more usually met with fluttering about tea bushes and low-growing jungle bushes. Its transformations are unknown.

83. CYANIRIS LIMBATUS, Moore.

This species is not given by Moore in his Lep. Ceylon. "It is very near to *C. lanka*, Moore, the latter, however, in the male being still darker on the upperside, the narrow black border still narrower, and the discal series of spots on the underside of the forewing arranged almost in a connected line, not well-separated and irregularly-placed as in *C. limbatus*, [this is very distinctive]. It differs from *C. singalensis*, Felder, only in the colour of the upperside in the male being of a deeper shade; the markings of the underside in that species are perhaps placed rather more in echelon." (*de Nicéville*, Butt. Ind., vol. iii, p. 109). It is found in the hill districts but not at the same elevation as *C. singalensis*, Felder, or *C. lanka*, Moore, Manders notes that he has not met with it in Nuwara Eliya or on the Horton Plains where the latter swarms. It is found in South India, Bengal, the Khasi Hills, and N.-E. Sumatra. Its transformations are unknown.

84. ZIZERA LYSIMON, Hübner.

Moore as *Z. karsandra*, Moore. Abundant nearly all the year round in the low country. Very widely spread, found in Europe, Africa, Teneriffe, Bourbon, Johanna, the Canary Islands, Mauritius, Madagascar, Arabia, almost throughout Southern Asia, and Malayana to Australia. It is seasonally dimorphic, the form flying in the rains being usually larger and much darker than that found in the dry-season. The larva feeds on *Amarantus*.

85. ZIZERA GAIKA, Trimen.

Moore as *Z. pygmæa*, Snellen, but Trimen's name has 14 years priority. Found in Ceylon in the same localities as the last, but is not so abundant. Found almost throughout Africa, Arabia, India and from Malayana to the Pacific. It has been bred on *Nelsonia* in South India.

86. Zizera otis, Fabricius.

Moore as *Z. indica*, Murray. A common low country insect in Ceylon, and flies nearly all the year round. The three species of *Zizera* usually occur together, and may be at once recognized by their habit of fluttering about amongst low herbage and grass within a few inches of the surface of the ground. Amongst other places they occur commonly on the Galle Face at Colombo. *Z. otis* inhabits all India and across Southern Asia to Hong-Kong, Burma, the Malay Peninsula, the Philippine Islands, and probably most of the islands of the Malay Archipelago and the South Sea Isles. The larva feeds on *Alysicarpus vaginalis*.

87. Azanus ubaldus, Cramer.

Not given by Moore, but Mr. Francis A. Fairlie has taken it at Jaffna in July, and on the North Central Road. It is found in Arabia and almost throughout India. It has frequently been recorded from Africa as *A. zena*, Moore. Dr. Butler in 1897 wrote that the male of *A. ubaldus* has no belt of thickened lilac scales across the upperside of the forewing, these scales being present in *A. zena*, but if the females got mixed as to locality it would be no easy matter to sort them. Its transformations have not been recorded, but the larva is said to feed on the leaves of *Acacia leucophlœa*.

88. Azanus jesous, Guérin.

Moore as *A. crameri*, Moore. *Polyommatus jesous* was described in 1847; *Lycæna gamra*, Lederer, in 1855; *Lampides agave*, Walker, in 1870; and *Azanus crameri* in 1881, these four names representing one species. In Ceylon it is rare, and is found more especially in the hotter and drier parts of the island, though occasionally met with at Colombo. Wade got it at Hambantota, and Fairlie in the northern part of the Island rather commonly. It occurs in Africa, Syria, Arabia, and many localities in India. Its transformations are unknown.

89. Lycænesthes lycænina, Felder.

Originally described from a specimen taken at "Avisavelle, Ceylon," on December 7th. Not uncommon in Ceylon on the lower hills. It is found almost throughout India, and in the Malay Peninsula, Sumatra, Borneo and Lombok. Its early stages have still to be discovered.

90. Talicada nyseus, Guérin.

Occurs commonly but locally in the low country and up to nearly 4,000 feet. It is found in South India, Sind, Orissa, Assam and Burma. Larva feeds internally on the fleshy leaves of *Bryophyllum*.

91. EVERES ARGIADES, Pallas.

Moore as *E. parrhasius*, Fabricius. Abundant everywhere in Ceylon. It does not appear to be found in Africa, but occurs in Europe, almost throughout Asia, Malayana, in Australia, and the isles of the Pacific, also in North America under a slightly modified form. The larva in Europe and America feeds on *Leguminosæ*, but it does not appear to have been bred elsewhere.

92. NACADUBA MACROPHTHALMA, Felder.

Not uncommon in the middle hill districts of Ceylon, and fairly common in the lower hills and in the neighbourhood of Colombo. It is found in many parts of India, the Malayan Islands, and in Australia. Its transformations are unknown.

93. NACADUBA HERMUS, Felder.

Moore as *N. viola*, Moore. It is a rare insect in Ceylon, but is probably overlooked from its resemblance to other species of the genus, "It can, however, be easily distinguished by the very acute apex and straight outer margin of the forewing, and posteriorly attenuated hindwing, with the outer margin very straight." (*de Nicéville*, Butt. Ind., vol. iii, p. 147). Manders has taken a single specimen close to Colombo in November, and has notes of its occurrence at Haldummulle. It is widely spread in India, Malayana, Australia, and the South Sea Islands. It has never been bred.

94. NACADUBA ATRATA, Horsfield.

Dr. Moore in Lep. Cey. records *N. atrata* and *N. prominens*, Moore, as distinct species, but they cannot be satisfactorily separated. It is common in the middle hill districts and also in the low country of Ceylon. Like the last it has a wide range in India, the Malay Peninsula and Archipelago. Moore describes the transformations of *N. prominens*, the larva feeding on *Vateria*. In Southern India the larva of *N. atrata* feeds on *Embelia*.

95. NACADUBA NOREIA, Felder.

Described by Felder in 1868 from "Niuera Ellia," at about 6,000 feet, taken on 24th December, 1864. Mr. de Nicéville has examined the female type example in the Natural History Museum at Vienna, and finds that it is the tailless form of *Nacaduba ardates*, Moore, which also has a tailed form recorded by Moore from Ceylon, and described by him in 1874. Manders finds that both forms occur together at Nuwara Eliya and Kandy at the same season, in May and June, and again in

November and December. In Colombo he has only taken the tailless form, which flies in November and December. Dr. Moore in Lep. Cey., vol. iii, p. 350, gives a note by Mr. E. E. Green regarding the two forms of *N. noreia*, from which one gathers that Mr. Green believes them to represent distinct species. Breeding alone can satisfactorily settle the point one way or the other. Mr. Thomas B. Butt writing from Densworth, Awissawella, Ceylon, under date the 3rd December, 1890, says: "*N. ardates*, tailed and tailless, is quite promiscuous here. The last fine day almost that we had I took nine on or near some buffalo droppings, four were tailless, five were tailed." *N. noreia* has a wide range in India and Malayana, and occurs also in Northern Australia. Its larva has been bred on *Acacia cæsia* in South India.

96. JAMIDES BOCHUS, Cramer.

A very abundant species everywhere in Ceylon, from whence it was originally described, and occasionally migratory, at any rate in the hills. It occurs generally in India, in Burma, and Malayana. The larva feeds on *Xylia* and *Butea* in South India.

97. LAMPIDES ELPIS, Godart.

A common seasonally dimorphic species in the middle and lower hills. The larva feeds on cardamoms, and at times causes considerable damage to the crop. It also eats the flowers and seeds of *Kæmpfæria pandurata* in South India. *L. elpis* has a very wide range in India and Malayana.

98. LAMPIDES CORUSCANS, Moore.

Strictly confined to Ceylon, where it is much less common than the last-named species, and found chiefly in the Kandy and Awissawella districts flying in the jungle. Its transformations are unknown.

99. LAMPIDES LACTEATA, de Nicéville.

L. lacteata, de Nicéville, Journ. Bomb. Nat. Hist. Soc., vol. x, p. 36, n. 17, pl S, figs. 25, *male*; 26, *female* (1895); *L. pseudelpis*, Moore (*nec* Butler), Lep. Cey., vol. i, p. 95 (1881); id., de Nicéville, Butt. Ind., vol. iii, p. 165, n. 736 (1890).

Apparently confined to and rare in Ceylon, Moore gives no localities for it; Manders has taken it at Kandy and Labugama in May; and de Nicéville has two pairs only from Ceylon with no precise locality recorded. It is probably frequently confounded with *L. elpis*, Godart, and has not been bred.

100. LAMPIDES CELENO, Cramer.

Moore as *L. ælianus*, Fabricius. Abundant everywhere, and highly seasonally dimorphic; specimens taken at a considerable elevation in the dry cold weather (such as Nuwara Eliya in January) have the underside somewhat deep fuscous. It has a wide range in India, Indo-China, China, and Malayana, extending even to the islands of the Pacific. It has frequently been bred.

101. CATOCHRYSOPS STRABO, Fabricius.

A common species everywhere in Ceylon. It is found from India to Australia. It has frequently been bred; the larva feeds on *Ougeinia*, *Schleichera* and *Dolichos*.

102. CATOCHRYSOPS LITHARGYRIA, Moore.

Not common in Ceylon, from whence it was originally described, but occurs both in the low (Colombo) and hill (Nuwara Eliya) country. It is very closely allied to *C. strabo*, Fabricius, the females been indistinguishable. The males, however, are readily differentiated, the male of *C. strabo* being lilac, of *C. lithargyria* a pale silvery blue. It has been recorded from many localities between India and Australia where *C. strabo* is found, but never without that species. Its transformations are unknown.

103. CATOCHRYSOPS CNEJUS, Fabricius.

Very common everywhere in Ceylon, particularly so in the Northern Province. Its range is immense, being found from India through China, Malaya and Australasia to the South Sea Islands. It has frequently been bred on various plants of the Natural Order *Leguminosæ*.

104. CATOCHRYSOPS PANDAVA, Horsfield.

Local and not common, found towards the north of the island and along the North Central Road, also at Hambantota. It is not nearly as widely spread as the other species of the genus given above, but occurs all over India and in many of the Malayan islands as far east as Bali and Sumba at all events. It is highly seasonally dimorphic, and the larva feeds on the young fronds of Cycads.

105. TARUCUS THEOPHRASTUS, Fabricius.

Prefers the hottest and driest parts of the Island, such as Hambantota in the south and the Jaffna district in the north, flying in July. It is found in Northern Africa, Sacotra, Arabia, in many parts of India, and in the Malayan island of Sumba. Dr. Holland has described a *Tarucus clathratus* from Celebes, which probably is the same species. The transformations of *T. theophrastus* are well known, the larva feeding in *Zizyphus*.

106. TARUCUS TELICANUS, Lang.

Moore as *T. plinius*, Fabricius. An uncommon but widely distributed insect in the low country of Ceylon. It has a wide range, being found in Africa, Arabia, India, Burma, the Malay Archipelago, Formosa, Australia, and the islands of the South Sea. Its transformations are well known, the larva feeding on the leaves of *Sesbania*.

107. CASTALIUS ROSIMON, Fabricius.

Common in the low country jungles and on waste land in Ceylon. It has a wide range in India, Burma, the Malay Peninsula and onwards through the Malay Archipelago to Flores. It has frequently been bred on *Zizyphus*.

108. CASTALIUS ETHION, Doubleday and Hewitson.

Found in Ceylon in the same localities as the last but is not so common. It appears throughout the year except in the very dry weather. In India its range is more restricted than the last, but extends to the east as far as Flores at any rate. The larva feeds on *Zizyphus*.

109. CASTALIUS DECIDIA, Hewitson.

Moore as *C. decidia* and *C. hamatus*, Moore. It is seasonally dimorphic, the rains form is *C. hamatus*, an intermediate form is true *C. decidia*, while the dry-season form is *C. interruptus*, de Nicéville. It is found in Ceylon in the same localities as the other two species of the genus, as for instance at Heneratgoda in August, and at Labugama in November and December. This species is confined to India, Burma and Ceylon, not even occurring in the Malay Peninsula. Its transformations are known, the larva feeds on *Gonania* and *Zizyphus*.

110. POLYOMMATUS BŒTICUS, Linnæus.

Moore as *P. bæticus*. An abundant species in Ceylon, found everywhere and at all elevations. Occurs almost everywhere in the Old World. Its transformations are well known.

111. AMBLYPODIA ANITA, Hewitson.

Moore as *A. naradoides*, Moore, and *A. darana*, Moore, which are synonyms of *A. anita*. Common in the low country of Ceylon. The female is dimorphic, being smalt-blue in one form on the upperside, uniform pale violet-brown in the other. It is found in South India, North-East India, Assam, Burma, the Andaman Isles, Siam and Borneo. The larva feeds on *Olax*. In Moore's plate (Lep. Cey., pl. xliii) of this species, figs. 1, 1*a* refer to *A. naradoides*, fig. 2 to *A. darana*, the numbering being reversed.

112. IRAOTA TIMOLEON, Stoll.

Moore as *I. mæcenas*, Fabricius, which is a synonym of *I. timoleon* Found in August and probably other months in the Northern, Eastern and Southern districts. It occurs also in India, China and several of the Malayan islands. The larva feeds on *Ficus*.

113. SURENDRA QUERCETORUM, Moore.

Moore as *S. discalis*, Moore, which differs only from the typical form in being somewhat smaller. In Ceylon it is abundant in the low country, and up to about 2,400 feet. It is found in many parts of India and Burma, in Java and Sambawa. The larva feeds on *Acacia*.

114. ARRHOPALA PIRAMA, Moore.

Moore as *Nilasera pirama*. A local Ceylonese and South Indian form of the widely distributed *A. centaurus*, Fabricius, but easily discriminated in both sexes by the brilliant blue (not dull purple) colour on the upperside of both wings. It is very common in the neighbourhood of Colombo, and may often be seen flying about the mangoe trees in the Victoria Park just before sunset. Moore records it from Galle and Kandy. The parent form, from which many local races have been derived, has a wide range in India, Burma, Indo-China, and Malaya. The larva appears to feed on a great variety of plants.

115. ARRHOPALA AMANTES, Hewitson.

Moore as *Nilasera amantes*. Found in the same localities as the last, and is perhaps even more abundant. From *A. pirama*, Moore, it may be easily distinguished by the presence of a well-formed lobe at the anal angle of the hindwing. It has a wide range in India, and occurs also in Burma, the Andaman Isles, Bali, Celebes and Sumba. Its transformations are known, the larva feeding on a variety of plants.

116. ARRHOPALA ABSEUS, Hewitson.

Not hitherto recorded from Ceylon, but Mr. F. M. Mackwood informs us that it occurs in the Ratnapura district, and there is a single example in the Colombo Museum. It is found very rarely in Southern India, but is common in the North-East, in Burma, the Malay Peninsula, and many of the Malayan islands. Mr. G. C. Dudgeon has bred it in Sikkim, but its transformations have not been described. The larva probably feeds on Sāl (*Shorea robusta*).

117. CURETIS THETIS, Drury.

Moore as *C. thetys.* Not uncommon at Kandy, Trincomali, and in the low country generally. It is common in many parts of India and has been recorded from Indo-China and several of the Malayan islands. Its transformations are well known.

118. ZESIUS CHRYSOMALLUS, Hübner.

Very abundant in the low country about cashew trees nearly all the year round, but more especially in November. It is a very constant species, showing no variation. It occurs locally in India at Barrackpore near Calcutta, the Malda district in Bengal, Chota Nagpur, the Central Provinces, Bombay, Ganjam, the Nilgiri Hills and in Travancore. It has been frequently bred.

119. CAMENA DEVA, Moore.

Moore as *Pratapa deva.* If *Camena* is held to be too near to *Camæna* (the latter name having priority), then *Pratapa* must be used for the genus. Not uncommon in the low country and up to about 4,500 feet. It is found also in many parts of India and Burma, and in Nias Island, Java, and the Philippines. Its transformations are known, the larva feeding on *Loranthus.*

We are unable to state definitely, or even perhaps approximately, the number of species of the genus *Aphnæus* which are found in Ceylon. It is without doubt a most puzzling genus, and in many cases it is obviously difficult to say where one species ends and another begins, and until some one undertakes breeding experiments on an extensive scale and records them carefully, it must be a matter of individual opinion as to how many there are. The following species have been recorded from Ceylon.

120. APHNÆUS VULCANUS, Fabricius.

Not recorded by Dr. Moore in Lep. Cey. from Ceylon, where, however, it is a very common low country insect. It is a common species also in India, and occurs in N.-E. Sumatra and Java. Its transformations are known, the larva feeding on the leaves of *Clerodendron.*

121. APHNÆUS FUSCA, Moore.

This is probably identical with *A. vulcanus*, Fabricius, and is always found with that species. Hitherto it has only been recorded from Ceylon. It has not been bred.

122. APHNÆUS SCHISTACEA, Moore.

Occurs commonly in August in the Dambool district, and also in the immediate neighbourhood of Colombo. It has been recorded from Sattara in the Bombay Presidency, from the Nilgiri Hills, and from Myingyan in Upper Burma. It has not been bred.

123. APHNÆUS LOHITA, Horsfield.

Moore as *A. lazularia*, Moore. Found in the same districts and at the same seasons as the last. It has a wide range in India, Indo-China, China, Hainan Island, and Malaya. Its transformations are known, Dr. Moore says the larva feeds on *Convolvulaceæ.*

124. APHNÆUS ZEBRINUS, Moore.

Described by Dr. Moore in 1884 from Ceylon only, but omitted by him from Lep. Cey., vol. iii, published in 1887. We have failed to recognise the species. Mr. J. J. Walker records it from Hongkong in Southern China.

125. APHNÆUS ICTIS, Hewitson.

Very common in the Dambool and Anaradhapura districts of Ceylon in August. It is widely spread in India, but has never been bred. The *A. vulcanus*, var. *maximus* of Elwes, from Burma, is a form of *A. ictis*, and may be kept distinct on account of its very large size.

126. APHNÆUS NUBILUS, Moore.

Described from Ceylon only by Dr. Moore, taken by Mackwood at Wattegama in May. It is very doubtfully distinct from the last, though Mr. Frank A. Fairlie, who has a very extensive acquaintance with the imagines of the genus in life as they occur in Ceylon, brings forward arguments to show that it is a distinct species. It can only be satisfactorily settled if it be so or not by breeding, though a critical examination of the prehensores of the male would doubtless shed some light on the subject.

127. APHNÆUS GREENI, Heron.

Spindasis greeni, Heron, Ann. and Mag. of Nat. Hist., sixth series, vol. xviii, p. 190 (1896).

Described from a single male captured near Punduloya, on the summit of the Great Western range of hills in Ceylon, at this point attaining a height of about 6,000 feet. Mr. de Nicéville has examined this specimen in the British Museum, but would prefer to express no opinion regarding its validity as a distinct species.

128. TAJURIA CIPPUS, Fabricius.

This species is usually known and is described by Moore in Lep. Cey. as *T. longinus*, Fabricius (see Aurivillius, Ent. Tids., vol. xviii, p. 146, nn. 48, 49 (1897). It is not uncommon in the lower and middle hill districts of that island, and has a wide range in India and Malaya. It has often been bred, the larva feeding on *Loranthaceæ*.

129. TAJURIA JEHANA, Moore.

Not recorded by the describer from Ceylon. It has been taken in the Jaffna district of Ceylon in July by Mr. F. A. Fairlie. It is closely related to *T. cippus*, Fabricius, but may be easily distinguished by its slatey-blue coloration on the upperside of both wings in the male. The females of the two species are difficult to discriminate. It is somewhat widely spread in India, but has not been bred.

130. HYPOLYCÆNA NILGIRICA, Moore.

Known only from the Nilgiri Hills and from Ceylon, where Mr. Fairlie has taken it near Jaffna in the North Central Province in July, Mr. Mackwood at Matale and at Dolosbage in March, and Manders at Heneratgoda in June. Its transformations are unknown.

131. CHERITRA JAFFRA, Butler.

Moore as *C. pseudojafra*, Moore. Confined to South India and Ceylon, replaced in Northern India, Burma, Indo-China and Malaya by *C. freja*, Fabricius. In Ceylon *C. jaffra* is not uncommon in low country jungle, extending up to 2,500 feet elevation. Its larva feeds on *Xylia*.

132. RATHINDA AMOR, Fabricius.

Not rare about Kandy and in the low country jungles, found also near the rock fortress of Sigiri in August. It is found in many parts of India, even in the city of Calcutta. Its larva feeds on many plants, and is probably the one figured by Moore in Lep. Cey., vol. i, pl. xxxiv, fig. 1*b*, *larvæ* and *pupæ* as that of *Spalgis epius*, Westwood. It is also figured in Horsfield and Moore's Cat. Lep. E. I. C., vol. i, pl. xii, figs. 7, *larva*; 7*a*, *pupa* (1857).

133. HORAGA CINGALENSIS, Moore.

Moore as *H. ciniata*, Hewitson. A very rare insect, recorded by Moore from Kandy, where a few specimens have been taken; possibly also to be found in the lower hills. If really distinct from the Indian *H. onyx*, Moore, it is confined to Ceylon, and its transformations are unknown.

134. CATAPŒCILMA ELEGANS, Druce.

Moore as *Catapœcilma elegans.* This beautiful insect is common in the lower hills of Ceylon, and hardly differs from Indian and Malayan specimens. If the Indian is distinct from the Malayan form, Mr. H. H. Druce suggests the name *major* for the former. The larva feeds on *Terminalia*.

135. LOXURA ARCUATA, Moore.

Very common in the low country of Ceylon up to about 2,500 feet, and is closely allied to *L. atymnus*, Cramer, of India and Malaya. Its transformations are known, the larva feeding on *Smilax*.

136. DEUDORIX EPIJARBAS, Moore.

A common low country insect in Ceylon, and widely spread in India, China and Malaya. Its larva is an internal feeder, eating the fruit of the pomegranate, horse-chestnut, and *Cinnarus*. It pupates inside the fruit.

137. RAPALA SCHISTACEA, Moore.

Not given by Moore in Lep. Cey. It is a species of wide distribution in India and Malaya, and is probably frequently overlooked from its close resemblance to *R. lazulina*, Moore, from which the male is distinguished by having a brilliant metallic blue gloss in certain lights on the upperside of both wings; the females of the two species are very similar. In Ceylon it has been taken by Mr. Fairlie in the Northern Province, and occurs also in the Haldummulle district. It has been bred often, the larva feeding on a great variety of plants.

138. RAPALA LANKANA, Moore.

The type, a female, was described by Moore in Lep. Cey. as *Deudorix lankana* from a specimen taken by Capt. Wade in the Kottawa forest near Galle. Manders has only seen three specimens of this rare insect, two males in the Colombo Museum and one in his own taken in October, all from the low country. The males have even a more brilliant and extensive iridescent purple gloss than has *R. schistacea*, Moore, and may also be readily distinguished by the ferruginous (not grey) under surface; also by its larger size. Elsewhere it has been recorded only from North Kanara, the Nilgiri Hills, and in Travancore. It has never been bred.

139. RAPALA LAZULINA, Moore.

Occurs in Ceylon at Kandy, Kaduganawa and the Haldummulle district, and has been recorded from the Nilgiri Hills of South India.

Is it really distinct from *R. varuna*, Horsfield (= *R. orseis*, Hewitson)? It has never been bred.

140. RAPALA MELAMPUS, Cramer.

Not given by Moore in Lep. Cey. Mr. F. Fairlie writes "I have taken only males of this species at Manipai near Jaffna, about half a dozen, on a windy day on the sheltered side of some tree, tamarind for choice, which is in full flower in July, and attracts a great number of butterflies." The northern parts of the Island have by no means been so thoroughly explored for butterflies as the other portions, and Mr. Fairlie has added several species to the Ceylon list from thence. A more extended and prolonged tour would probably result in further additions, most of which would probably be closely allied to or identical with South Indian species. *R. melampus* may at once be distinguished from the other species of the genus found in Ceylon by the wings of the male on the upperside being scarlet instead of blue; those of the female are dull brick red. It has a wide range in India, and occurs also in Burma, Sumatra, Nias, and Java. The larva feeds on *Ougeinea* and *Zizyphus*.

141. BINDAHARA SUGRIVA, Horsfield.

Moore as *B. phocides*, Fabricius. Uncommon in the low country, particularly about Kandy, where Capt. Wade states, however, that he found the male plentiful in the Botanical Gardens. It is found occasionally as high as 4,000 feet elevation, and is rare at Haldummulle. Mr. W. H. Miskin in "A Syn. Cat. of the Lep. Rhop. of Australia," p. 69 (1891), placed under *B. sugriva*, Horsfield, the *Myrina isabella* of Felder, the *B. phocides* of Moore *nec* Fabricius, and the *M. jolcus* of Felder as synonyms, and makes the following remarks:—"With great regard for the opinions of Messrs. Distant and de Nicéville, I have little doubt this, with *B. phocides*, Fabricius, and *B. areca*, Felder, all represent one rather variable species. In one specimen I have, from Ceylon, the blue colour in the apical region of the hindwing is restricted to a mere marginal line, only just perceptible; in a Cape York [North Australia] example the blue patch is as broad as long, and nearly touches the apical angle, the underside of both being exactly alike, and nearly as dark as in Horsfield's figure. The development of the white area in the hindwing of the female, and the lighter or darker shading of the underside, is so variable as to be quite unreliable for specific distinction." It would be interesting to know if the males of *B. sugriva* in Ceylon are often as variable as Mr. Miskin would appear to consider the species to be throughout the wide range of the genus. The many specimens we have seen from Ceylon are quite constant. We have specimens from South India, Sumatra and Java. The larva feeds on the inside of the fruit of a creeper in South India.

142. VIRACHOLA ISOCRATES, Fabricius.

Common in the driest parts of the Island and along the North Central Road, in July. Wade records it from Hambantota in July. It occurs also in many parts of India, the larva feeding on the fruit of the pomegranate, tamarind, *Diospyros* and *Randia*.

143. VIRACHOLA PERSE, Hewitson.

All the remarks given above for *V. isocrates* apply equally well to this species, except that the larva has been bred from the fruit of the pomegranate and *Randia* only.

Family PAPILIONIDÆ.

Subfamily PIERINÆ.

144. LEPTOSIA XIPHIA, Fabricius.

Moore as *Nychitona xiphia*. Widely distributed over Ceylon and not uncommon in low country jungles. It is very constant, hardly varying at all in coloration and markings. It is found almost throughout India and Malaya. The larva feeds on various capers (*Capparis*).

145. DELIAS EUCHARIS, Drury.

Abundant everywhere in Ceylon, more particularly in the low country. Common also in India; Dr. Butler has recorded it from Burma and Penang! The larva feeds on *Loranthus* as usual in this genus.

146. PRIONERIS SITA, Felder.

Fairly common at moderate elevations in Ceylon, Manders has taken it in Punduloya in January, and has noted its occurrence amongst other places at Haputale, 5,000 feet, Koslande, 2,500 feet, Behilul Oya, 2,200 feet, and Wellaway, 500 feet. Mackwood records it from the hills from 2,000 to 6,000 feet. It is a splendid mimic in both sexes of the highly protected *Delias eucharis*, Drury, but its more rapid and somewhat darting flight makes it easily distinguishable when on the wing. The acutely-pointed apex of the forewing is also a noticeable feature even in flight. The female is extremely rare. It occurs rarely in South India, and has been bred by Mr. E. E. Green in Ceylon on *Capparis*.

147. Catopsilia crocale, Cramer.

Moore as *C. crocale* and *C. catilla*, Cramer, but the former is the older name. It is a very variable species, which does not appear to be dependant on the seasons for its various forms. It is very widely distributed in India, Malaya and Australasia, and seems to be variable wherever it is found. It is largely given to migrating in Ceylon and Southern India, and again in Java. Its larva feeds on *Cassia*.

148. Catopsilia pyranthe, Linnæus.

Moore in Lep. Cey. gives four forms of this species as separate species, *C. gnoma*, Fabricius, *C. ilea*, Fabricius, *C. chryseis*, Drury, as well as typical *C. pyranthe*. Manders notes that as far as his observations go these four forms are not dependent on season, but appear indiscriminately nearly throughout the year, those flying in the dry-season from February to April being a little smaller than those found during the rest of the year. *C. chryseis* is perhaps not as common a form as the others. It takes part in the low country flights. It occurs everywhere in India and Malaya, the larva feeding on *Cassia*.

149. Terias libythea, Fabricius.

Moore as *T. drona*, Horsfield. Dr. Butler considers that *T. senna* and *T. lerna*, both of Felder, represent the wet-season form of this species, *T. drona* is a form intermediate between the dry and wet-season forms, and the dry-season form is true *T. libythea*, with *T. rubella*, Wallace, and *T. hainana*, Moore, as synomyms. In Ceylon it is common in open country between 2,000 and 5,000 feet. It has a very wide range in the East. Like all the rest of the genus, the larva feeds on the *Leguminosæ*.

150. Terias venata, Moore.

Moore as *T. cingala*, Moore, and *T. rama*, Moore. Dr. Butler omits the former species from his "A Revision of the Pierine Butterflies of the genus *Terias* from the Old World." (Ann. and Mag. of Nat. Hist., seventh series, vol. i, p. 64, n. 21 (1898). He gives the range of *T. venata* "From the Himalayas southwards to Ceylon, and probably eastwards through North China, for we have it from Chusan Island and from the Philippines." He also notes that "The seasonal (?) forms differ less than usual: *T. rama* [and also *T. cingala*] is probably the best-marked wet type, *T. santana*, Felder, intermediate, and *T. venata* (of which *T. pallitana*, Moore, is the female) the dry; but, on the other hand, it is possible that, as seems to be the case in the closely allied *T. betheseba*, Janson, from Japan and Hainan Island, no differing dry form may exist, and the slight discrepancies in the pattern of the upper surface or the definition of the markings on the under surface may be partly local and have a subspecific value. The fact that we have the extremes from the Anamully Hills in South India proves that they are not permanently separated as distinct species." Without seeing the type specimens of *T. cingala* it is difficult to say exactly what it is, it may be that it is a form of *T. libythea*, Fabricius, rather than of *T. venata*. In Ceylon *T. venata* is distinctly variable, and is found there at the same elevations as the last and throughout the year. It has not been bred as far as we are aware.

151. TERIAS HECABE, Linnæus.

Dr. Butler has recently stated in his paper on *Terias* above referred to that *T. hecabe* does not occur in India or Ceylon but is found in Southern China, while what we have been accustomed to call *T. hecabe* is the *T. suava* of Boisduval, which Butler restricts to India and Ceylon, and Burma southwards to Malacca including the Mergui Archipelago. The only difference Butler gives between *T. hecabe* and *T. suava* is that the former is "broader-winged." According to the late Capt. E. Y. Watson, *T. hecabe* may be known "By never having more than two streaks or spots in the discoidal cell on the underside of the forewing in addition to the reniform spot on the disco-cellular nervules." Again "The dry-season form at the apex of the forewing on the underside has a more or less strongly pronounced brown patch." Manders notes that the larva feeds in his compound in Colombo on the leaves of the Madras Thorn, and that he has considerable experience of the insect as it is so common. The spots in the cell of the forewing on the underside are sometimes reduced to one or even absent altogether. The brown patch mentioned above is not absolutely indicative of the dry-season form; it varies considerably in size, and is found in the females at the commencement at any rate of the wet-season. True *T. hecabe* is a wet-season form, besides which Moore records from Ceylon *T. hecabeoides*, Ménétriès, also a wet-season form, and *T. simulata*, Moore, a dry-season form. *T. hecabe* is adundant everywhere in Ceylon and occurs at all seasons. The larva feeds in *Leguminosæ*.

Dr. Butler records *T. nicobariensis* (recte *nikobariensis*), Felder, from the Andamans, Nicobars, Java, Sumatra, Flores, Borneo, and the Philippines, and notes that the British Museum has "A female apparently referable to the intermediate form of this species, but said to have been taken in Ceylon." He gives *T. phanospila*, Felder, as a synonym, and says it is the dry-season form. Mr. de Nicéville has examined the type of *T. nikobariensis* at Vienna, and considers it to represent a variety of *T. hecabe* only.

152. TERIAS SILHETANA, Wallace.

Dr. Moore does not record *T. silhetana* from Ceylon, but gives *T. citrina*, Moore, which is a dry-season form, *T. rotundularis*, Moore, a wet-season form, *T. uniformis*, Moore, also a dry-season form, and *T. templetonii*, Butler, also a wet-season form. The butterfly is common in the middle and lower hill districts, but is only found rarely at the sea-level. It varies much in size, markings and in the form of the wings. *T. citrina* has always (?) three spots in the discoidal cell of the forewing on the underside exclusive of the reniform markings on the disco-cellular nervules, and sometimes has and at other times lacks an ochreous apical marking. A larger dry-season form 1·75 inches in expanse has a well-developed and almost square ochreous patch at the apex of the forewing on the underside, with the usual three spots in the cell. In one specimen in Manders' collection one of these spots (the basal one) is almost obsolete. The form *T. rotundularis* may be known by the more rounded shape of all the wings, which gives it a peculiar facies, so much so that Mr. Mackwood is strongly biased in favour of its being a distinct species. Mr. Ormiston of Kalupahani recently informed us that from one batch of eggs (whether laid by the same parent or not is unknown) he has bred all the above forms. In Ceylon the larva feeds on *Albizzia Moluccana* and is gregarious.

153. TERIAS SARI, Horsfield.

Recorded by Dr. Butler from Ceylon, the Nilghiris, Burma, the Mergui Archipelago, Malacca, Sumatra, Java, Borneo, the Sulu Archipelago, and Palawan. We have specimens only from Sumatra, Java, Banka and Borneo. Dr. Moore also omits it from Ceylon. Watson says "*T. sari* is a very constant and easily recognisable species: it has on the underside only a single wavy line in the discoidal cell of the forewing, in addition to the usual disco-cellular markings, and the whole of the apex widely and evenly chocolate-brown, and also has a more or less diffused dark spot towards the outer angle."

154. IXIAS CINGALENSIS, Moore.

Moore as *I. cingalensis* and *I. pirenassa*, Wallace. In describing the latter Wallace wrote "Male, costa much curved, hindwing subtriangular. Upperside, both wings like '*Thestias*' *pyrene*, Linnæus [which he restricts to N. India, Bengal, China], but the transverse black band always touches the discoidal spot of the forewing." Its habitat he gives as Bombay and Madras. Moore appears to have kept the two species separate chiefly because *I. cingalensis* has the underside uniformly yellow without markings, while *I. pirenassa* is considerably marked with purple-brown spots. These characters are due to season, the first occurring in the wet, the second in the dry-season. Watson keeps *I. cingalensis* and *I. pirenassa* distinct, the former having the yellow ground-colour of the forewing on the upperside of the male entering the second median interspace and filling the angle at the origin of the second median nervule, while in the second the yellow ground-colour does not enter the second median interspace, and he says that *I. pirenassa* is not found in Ceylon. Certainly Ceylon has only one species of the group of *I. pyrene*, Linnæus, but whether or no the Ceylon form can be always separated from the parent form is in our opinion extremely doubtful. Butler in his Revision of the Butterflies of the Genus *Ixias* (1898) has given *I. cingalensis* as the sole species of the *pyrene* group from Ceylon. He notes "*I. cingalensis* can be picked out at sight from a crowd of nearly allied forms, but the distinction given above [by Watson] is useless as a guide; its chief peculiarity is the narrowness and angularity of the orange belt across the forewing on the upperside in the male combined with the sharply defined and perfectly straight inner edge of this belt from the subcostal nervure to the first median nervule." He restricts *I. pyrene* to China, giving *I. sesia*, Fabricius, from Burma. *I. pirenassa* he records from Western India southwards to Depalpur. Watson restricts *I. pyrene* in India to Burma not extending west of Assam. In Ceylon *I. cingalensis* is found commonly all over the low country, and is peculiar to the island. It has not been bred.

155. IXIAS MARIANNE, Cramer.

Common in the hot dry country, not found above sea-level, and flies in June and October. It is found also in peninsular and continental India, and has been bred. The rainy season form is much larger and darker than the dry-season form.

156. TERACOLUS AMATA, Fabricius.

Moore as *Idmais modesta*, Butler. Moore records it from the low country, found abundantly in the Dambool District and north of it, also at Hambantota and in the Mullaitivu District. Manders got it commonly but worn in August at Anaradhapura. The female is dimorphic, Form I being salmon-coloured like the male, Form II being very pale primrose-coloured or almost pure white. It occurs in Africa, Arabia, Syria, Persia and many parts of India. Its transformations are known, the larva feeding on *Salvadora*.

157. TERACOLUS EUCHARIS, Fabricius.

Moore as *Callosune eucharis*. Dr. Moore gives no exact record of the occurrence of this species in Ceylon. Mr. Pole says that it is not found south of Puttalam, nor along the east coast as far as Trincomali as far as he is aware. It flies in June and December, has apparently two broods, is a very local species, and is a lover of the sun even on wind-blown and arid sea-shores. It occurs also in South India. Its transformations are unknown.

158. TERACOLUS LIMBATUS, Butler.

Moore as *Callosune limbata*. Moore records it from Hambantota, from the Trincomali side of the island, and from Vavoniya Vilankulam. Mr. Pole notes that it is found as far south as ten miles north of Negombo on the west coast, from Tangalle to Trincomali along the south and east coast, rejoicing in tall grass away from the wind, and used to be common in Fort Frederick, Trincomali, all the year round. It is confined to Ceylon, but is very close indeed to the Persian and Indian *T. etrida*, Boisduval, differing thereform only in the usually broader black outer margin to the hindwing on the upperside in the male. It has never been bred.

159. TERACOLUS DANAË, Fabricius.

Moore as *Callosune danæ* and *C. sanguinalis*, Butler. Our only record from Ceylon of this species is North Province, March, Dr. Moore gives no locality for it, but Mr. Pole says it is found in the same seasons and in the same localities as *T. eucharis*, Fabricius. Dr. Butler says that *T. danaë* is the wet-season form, *T. sanguinalis*, Butler, is an intermediate form, and *T. taplini*, Swinhoe, described from Bombay and Poona, is the dry-season form. It is found in Persia, and in Western and Southern India. Its transformations have not been recorded.

160. TERACOLUS TRIPUNCTA, Butler.

Moore as *Idmais tripuncta*. Recorded by Moore from Puttalam, rare in January. Mr. Pole says that it is not found south of the Batticaloa river, twenty miles south of Puttalam, and loves the glades along the edges of the forest, flying in June and October. Mr. Fairlie notes its occurrence along the North Central Road in July, the females flying in the morning between seven and eight o'clock, the males during the hottest part of the day at a very rapid rate and going right away without settling when once disturbed. It is found also at Manaar in January. It has a near ally in *T. fausta*, Olivier, which is found in Syria, Asia Minor, Persia, Baluchistan, Afghanistan, Sind, the Punjab and the Bombay Presidency; *T. tripuncta* being found also in the Bombay Presidency, the Central Provinces, South India, and along the east coast of India as far north as Orissa. It has never been bred.

161. **Belenois mesentina**, Cramer.

Moore as *B. taprobana*, Moore. Mr. H. Fruhstorfer in Berl. Ent. Zeitsch., vol. xlii, p. 326 (1897) has described the Ceylonese form of *B. mesentina* as *B. mesentina fervidior*, which in any case must fall as a synonym to *B. taprobana*. The lightest marked examples from Ceylon can be exactly matched with the darkest examples from India, so, although Ceylonese specimens average darker than Indian ones, we do not consider that the Ceylonese race can be justifiably keep distinct, even as a local form. Dr. Butler in Trans. Ent. Soc. Lond., 1898, p. 435, notes :—" We have a very extensive series of this species [in the British Museum], *B. angusta* = *agrippina* = *lordaca* being the wet phase, *B. mesentina* = *syrinæ* intermediate, *B. auriginea* dry, and *B. taprobana* being an insular dry phase differing in the blacker outer border to the forewing of the male, on which the subapical spots are less prominent." In Ceylon *B. mesentina* is uncertain in its appearance, but is abundant in the low country when it does occur, and then joins in the migratory flights, June and July, and again in November and December. It is found in Madagascar, Africa, Arabia, Persia, Syria, Afghanistan, Baluchistan, and throughout India. It has often been bred, the larva feeding on *Capparis*, and A. Grote says on *Zizyphus* also.

162. **Appias narendra**, Moore.

Moore as *Hiposcritia narendra*. Rare in Ceylon, recorded by Mackwood from the hills 2,000 to 4,000 feet. It is much more common in Southern India, being replaced in North-Eastern India, Burma, and Indo-China by the allied *A. indra*, Moore. It has never been bred.

163. **Appias neombo**, Boisduval.

Originally described from Brazil, neighbourhood of Bahia and Fernambouc, but Boisduval evidently doubted the correctness of this locality as he wrote " Should not this species be rather from the East Indies ? " We include it here solely on Dr. Moore's identification, in Lep. Cey. he records it as *Catophaga neombo*, and figures the male and Form I of the female, also describing the female Form III as a variety, this form he had previously figured in 1857. As regards his figure of the male, de Nicéville has none from Ceylon which match it, but he possess two males from North Kanara and one from Ootacamund which agree with it fairly well. Moore's figure of the white female Form I in Lep. Cey. is probably only a pale form of the female of *A. albina*, Boisduval, while his female variety is the yellow female Form III of the same species. Boisduval's description evidently applies to a female, as no male *Appias* has a figure-of-3 black band on the underside of the forewing. What is wanted to clear up the uncertainty regarding this species is a figure of Boisduval's type specimen, this being probably in M. Charles Oberthür's possession. We know nothing of the occurrence of *A. neombo* in Ceylon, and do not quote Dr. Moore's localities for it, as his specimens were based on incorrect identification. It has not been bred.

164. APPIAS ALBINA, Boisduval.

Moore as *Catophaga venusta*, Moore. In this species the female is trimorphic (in *A. paulina*, Cramer, it is dimorphic), Form I having the the ground-colour of the underside wholly white except a small patch of yellow at the costal base of the forewing; Form II having the ground-colour of the underside of the forewing at the apex and the entire hindwing chrome-yellow; and Form III having the underside of both wings as in Form II, but the upperside of both wings is also yellow. The male differs from that sex of *A. paulina* in having the forewing apparently less broad and the apex more produced and not slightly truncated, the outer margin is straighter, not so concave, and the discoidal cell appears to be longer and narrower; the black markings on the upperside are extremely variable in both species. It is particularly common in Ceylon, occurring wherever *A. paulina* is found and at the same seasons. It occurs all over India, in Burma, the Andaman Isles, the Malay Peninsula, Indo-China, China, the Malay Archipelago and Australia. It has never been bred.

165. APPIAS PAULINA, Cramer.

Moore as *Catophaga galene*, Felder, and *C. lankapura*, Moore. This species was originally described from Tranquebar on the Coromandel Coast of South India, and from Batavia in Java. As far as Dr. Moore's descriptions of *C. galene* and *C. lankapura* go they are fairly accurate but he does not realize that *A. paulina* is dimorphic in the female, as he gives the Form I only for *C. galene*, and Form II only for *C. lankapura*, nor that the extent of the black markings on the upperside of the male on which he lays stress to distinguish that sex of the two species is unimportant, being very variable, this variability apparently not being due to seasonal causes, as the lightest and heaviest marked specimens occur in the same month. The female is dimorphic, there being no Form III as in *A. albina*, Boisduval. For two reasons there is a slight doubt in de Nicéville's mind as to whether the name *paulina* should be applied to this species. The first is that Cramer described it from Tranquebar and Java. As far as de Nicéville is aware, the species does not occur in South India, only in Ceylon, but it is more than probable that many

Ceylonese butterflies were considered by the old authors to have come from Tranquebar, the port of shipment, which were really not caught there, but close by in Ceylon. Java is probably altogether an incorrect locality. Secondly, in one particular (though otherwise it is excellent and unmistakable), Cramer's figure (that of a female) differs from our specimens in that the upperside of the forewing shews four white spots on the apical white area while there should only be three, and moreover these spots instead of forming a curved line as they do in our specimens are shewn in pairs in echelon. As, however, this discrepancy is probably due to incorrect drawing, and there is no other species known which fits the figure better than the present one, de Nicéville has no doubt that the figure was taken from our species, especially as it is immensely common in Ceylon, is given to migrating, and is the most likely one to have been obtained by the old authors. L. de Nicéville's identification of this species does not coincide with that of Dr. Butler's as set forth by him in Ann. and Mag. of Nat. Hist., seventh series, vol. ii, p. 397, n. 10 (1898), de Nicéville believing that *A. paulina* is strictly confined to Ceylon, Butler recording it from India, Indo-China and Malaya. Dr. Butler also gives *Catophaga leis*, Hübner, as a synonym of *Catophaga paulina*, de Nicéville believing that species to be quite distinct. *A. paulina* is found all over Ceylon, but is more common at the commencement of the monsoons than as any other times, when it migrates in immense swarms. Strangely enough it has never been bred.

166. APPIAS LIBYTHEA, Fabricius.

Not common in Ceylon and mostly confined to the low country in the north and extreme south. The extent of the black markings on the upperside of the forewing in both sexes is variable. Two females in Manders' collection from the hill country, 4,500 to 5,000 feet, are much more heavily marked than those from the Hambyamma Tank, 500 feet. It is found nearly all over India. The larva as usual in the genus feeds on *Capparis*, but it also eats the leaves of *Cratæva.*

167. APPIAS TAPROBANA, Moore.

Moore as *A. taprobana*, and *A. aperta*, Butler (= *A. vacans*, Butler). This species is the South Indian and Ceylonese local race of the widely-spread *A. hippo*, Cramer, of Northern India, Burma, Malay Peninsula, Indo-China, China, and the Malay Archipelago. In Ceylon *A. taprobana* is an abundant insect in the low country. The larva feeds on capers (*Capparis*) as usual.

168. HEBOMOIA AUSTRALIS, Butler.

Moore as *H. glaucippe*, Linnæus. Dr. Butler in Ann. and Mag. of Nat. Hist., seventh series, vol. i, p. 290, n. 2 (1898) has separated off the South Indian and Ceylonese *H. australis* from the North-Eastern India, Burma, Malay Peninsula, and China *H. glaucippe*. The male is almost identical with *H. javanensis*, Wallace, from Java, but is smaller than *H. glaucippe*; the female differs from *H. javanensis*, and both sexes from *H. glaucippe* by the great reduction, and in some cases almost complete absence, of the black line separating the apical orange patch from the basal half of the forewing on the upperside. *H. australis* is abundant in the low hills of Ceylon, occurring very occasionally at Colombo; it is very common at Kandy. The female is much scarcer than the male. The larva feeds on *Capparis* and in South India also on *Cratæva*.

169. HUPHINA NERISSA, Fabricius.

Moore as *H. phryne*, Fabricius, and *H. zeuxippe*, Cramer. Dr. Butler in Ann. and Mag. of Nat. Hist., seventh series, vol. iii, p. 211, n. 46 (1899), gives *H. phryne* with *Papilio evagete*, Cramer, *P. zeuxippe*, Cramer, *P. cassida*, Fabricius, and *H. pallida*, Swinhoe, as synonyms, from India, Ceylon and Java. On page 211, n. 47, under *H. hira*, Moore, he gives *Pieris copia*, Wallace, and *Appias dapha*, Moore, as synonyms, from Burma. On page 212, n. 53, he gives *H. nerissa*, with *Papilio amasene*, Cramer, and *P. coronis*, Cramer, as synonyms, from Nepal, Darjeeling, Tonkin and China. Mr. de Nicéville arranges the names quite differently. Under *H. nerissa* from Ceylon, India, Burma, Indo-China, China and Hainan Island he gives *P. phryne*, *P. amasene*, *P. coronis*, *P. evagete*, *P. zeuxippe*, *P. cassida*, *P. hira*, *P. copia*, *A. dapha*, and *H. pallida*, as synonyms, thus uniting under one the three species kept distinct by Dr. Butler. The conclusions de Nicéville arrives at are these :—*H. nerissa*, the parent form (as being the first described) of this group of the genus, has the ground-colour of the underside of the hindwing white, and is found in Nepal, Sikkim, Bhutan, Assam, Burma, Indo-China, South China, Hong-Kong and Hainan. Absolute synonyms are *P. amasene* and *A. dapha*. In Nepal (probably), Sikkim, Assam, and Aracan where it meets typical *H. phryne*, with the hindwing on the underside some shade of yellow or sandy buff, the two races intermingle, this connecting link being *P. copia*, and it is impossible, especially in the female sex, to say to which race certain specimens should be apportioned. Were it not so, the two races might be kept as distinct species, as east of the Eastern Himalyas to Hainan Island the race is constantly *H. nerissa* (except at Shillong in Assam and at Chittagong in Aracan, North Burma, where very typical specimens of *H. phryne* are found), while south of the Himalayas to Ceylon the race is constantly *H. phryne.* In Burma there is a very interesting sub-local-race (if it may be so termed) which in both sexes on the underside of the forewing along the costa and at the apex, and in the hindwing at the base, is streaked with yellow, while the ground-colour remains white. It has not been named. Absolute synomyms of *H. phryne* are *P. coronis*, *P. evagete*, *P. zeuxippe*, *P. cassida*, *P. hira* and *H. pallida*. It is quite out of the question to allow two distinct species of this group of *Huphina* in Ceylon as Dr. Moore has done. *H. nerissa* is very common in the Island, though scarcer in some seasons than in others, and occurs at all elevations. It is highly seasonally dimorphic, and the larva feeds on *Capparis*.

170. HUPHINA REMBA, Moore.

An uncommon insect in Ceylon and of speedy flight, consequently is difficult to catch. It is found in the hill country between 2,000 and 4,000 feet, and is common at Pundaloya. It has been bred in South India, where outside of Ceylon it is alone found, and feeds on capers as usual. Dr. Butler records it from Mussoorie, which is certainly incorrect. Its coloration and markings vary greatly in accordance with the season, whether wet or dry.

171. NEPHERONIA CEYLANICA, Felder.

Originally described from "Rambodde and Trincomali." Dr. Moore in Lep. Cey. gives three species of *Nepheronia* as occurring in the Island, *N. ceylonica (sic)*, Felder, *N. fraterna*, Moore, and *N. spiculifera*, Moore. With the best will in the world we are unable to distinguish between these three species. It is obviously somewhat variable, but whether this variability is due to seasonal changes or to the elevation of its breeding places we are uncertain. It is extremely common all over the island and occurs in the low country as well as in the hills. It has a near ally in the South Indian *N. pingasa*, Moore. It has not been bred, but the larva almost certainly will be found to feed on capers.

Subfamily PAPILIONINÆ.

172. TROIDES DARSIUS, Gray.

Moore as *Ornithoptera darsius.* Common in the low country nearly all the year round; abundant also in the low hills, and occasionally seen at the highest elevations. The female is somewhat variable with regard to the amount of grey coloration on the veins of the forewing on the upperside; the male is very constant. *T. darsius* is peculiar to Ceylon. The larva feeds on *Aristolochia.*

173. PAPILIO HECTOR, Linnæus.

Moore as *Menelaides hector.* Common in the low country at certain seasons of the year, generally after the first outbreak of the two monsoons; abundant at Colombo. It is a common species in many parts of peninsular and continental India. The larva feeds on *Aristolochia.*

174. PAPILIO JOPHON, Gray.

Moore as *Menelaides jophon.* Peculiar to Ceylon, and confined locally to the middle hill district. It is not rare at Punduloya and Gampola in June, and is easily captured in the early morning; after the sun is up it flies fast and soars over the tops of the forest trees quite out of reach. Wade records it from Ambegamua and the Kottawa forest; Mackwood from the hills from 2,000 to 4,000 feet, very local, taken only in the Navalpotha and Pusilawa country in a tract of about twenty miles in extent in June. *P. jophon* has a near ally in the South India *P. pandiyana*, Moore. The latter species has not been bred, but Moore figures the larva of *P. jophon*, though he does not record its food-plant.

175. PAPILIO ARISTOLOCHIÆ, Fabricius.

Moore as *Menelaides ceylonica*, Moore. An abundant species in Ceylon, especially so in the low country. In its typical form *P. aristolochiæ* occurs almost throughout India, in Burma, Siam, the Malay Peninsula, China, the Loo Choo Islands, Natuna Islands, Java and Celebes. The larva feeds on *Aristolochia.*

176. PAPILIO DEMOLEUS, Linnæus.

Moore as *Orpheides erithonius*, Cramer. A common low country insect in Ceylon, and takes a large share in the annual migratory flights. It is found also in Arabia, Persia, throughout India, Burma, in China, and in Formosa Island. The larva feeds on plants of the Natural Order *Rutaceæ*, which contains the oranges, limes, pomolos, etc., and the evil-smelling Garden Rue.

177. PAPILIO MOOREANUS, Rothschild.

Moore as *Charus helenus*, Linnæus. This is a local race of *P. helenus*, confined to Ceylon, the South Indian local race being *P. daksha*, Hampson, typical *P. helenus* being found in North-East India, Burma, the Malay Peninsula, China and Southern Japan. Rothschild remarks in describing *P. mooreanus* that "It is very curious that Mr. F. Moore does not either describe or figure [in Lep. Cey.] the underside which exhibits the distinguishing characters," these being on the hindwing

"A complete series of seven subdiscal blue lunules, of which the three anterior stand at the outer edge of the white discal marks, and of which the two posterior are situated within the anal and subanal rufous spots." It is a very common insect at all elevations, but especially so in the low country. It is difficult to capture in good condition from its habit of flying in and out of the jungle which soon tatters it. Dr. Moore describes the transformations of this species, but does not give the food-plant of the larva, which, however, is almost certain to be plants of the Natural Order *Rutaceæ*.

178. Papilio parinda, Moore.

Moore as *Iliades parinda*. An abundant species in the low country and lower hill districts of Ceylon, to which island it is confined. The females are much rarer than the males. A very conspicuous insect on the wing and invariably figures in the boxes of insects sold to confiding passengers at exorbitant prices by rascally natives. In South India and northwards to Bengal it is replaced by the parent form, ***P. polymnestor***, Cramer. The larva feeds on *Rutaceæ*, especially on plants of the genus *Citrus*.

179. Papilio polytes, Linnæus.

Moore as *Laertias romulus*, Cramer. Abundant everywhere in Ceylon, and found throughout India, Burma, the Malay Peninsula, Indo-China, the Andaman and Nicobar Islands and Sumatra. Dr. Moore describes its transformations but does not mention the pabulum of the larva, which is plants of the Natural Order *Rutaceæ*.

180. Papilio lankeswara, Moore.

Dr. F. Moore as *Chilasa dissimilis*, Linnæus, *C. clytioïdes*, Moore, and *C. lankeswara*. The Hon. Walter Rothschild in Nov. Zool., vol. ii, p. 368 (1895) gives ***P. lankeswara*** sub-specific rank, with *clytioïdes* and *dissimilis* as aberrations, all three restricted to Ceylon, the parent form being ***P. clytia***, Linnæus, from Northern India. He notes that "The local races of *P. clytia* are all variable, but we have here a very curious example of incongruous variation: *P. clytia*, *P. clytia lankeswara*, and *P. clytia panope* are pronouncedly dimorphic. To each of these three geographical races belong a *clytia* and a *dissimilis* form; while, however, the *clytia*-form develops in the respective localities into a subspecies, its aberration *dissimilis*, though very variable in every locality, remains the same. The *dissimilis* from Ceylon, Assam, Tenasserim, etc., are indistinguishable; the *clytia* from there exhibits certain obvious differences. In Palawan and the Philippines the *clytia*-form alone occurs, the *dissimilis*-form is absent. On the contrary, the Andamans are inhabited by a *dissimilis*-form, whereas specimens corresponding to *clytia* are absent; and further east, in the lesser Sunda Islands, we find a species with the pattern of *dissimilis* and no *clytia*-like form. From Borneo, Sumatra, and Java no representative species of *P. clytia*, Linnæus, has been recorded." In Ceylon *P. lankeswara* is a common species in the lower hills. It is in all its forms an admirable mimic of species of *Danais* and *Euplœa*. In Ceylon the light form mimics *D. limniace*, Cramer, the dark form *E. asela*, Moore, and *E. montana*, Felder. Dr. Moore gives the food-plant of the larva as *Tetranthera*.

181. PAPILIO CRINO, Fabricius.

Moore as *Harimala montanus*, Felder, originally described from "Rambodde, Ceylon." In Ceylon it is common and widely distributed; the females are rare. It is less common in the higher hills, where it is probably a passenger only; it is abundant at Kandy, and common in the Northern Province as far north as Anaradhapura, in June, July and December. Rothschild says that the aberration *montanus* without woolly stripes on the forewing on the upperside along the veins of the male occurs all over the area of *P. crino*, which is throughout Southern India, the Central Provinces, Orissa and Bengal. The larva feeds on the leaves of the satin-wood tea in Ceylon.

182. PAPILIO ALCIBIADES, Fabricius.

Moore as *Pathysa antiphates*, Cramer. Rare and local in Ceylon, it seems to be more partial to the eastern and drier parts of the island. The parent form *P. antiphates* is from Eastern China, while *P. alcibiades* is found in India, Burma, the Malay Peninsula, and in many of the Malayan Islands. Rothschild describes the aberration *ceylonicus*, Eimer, as having "Two basal black bands on the upperside of the forewing extending beyond the median nervure; the fourth band broad and reaching the median nervure (not triangular). In these two characters ab. *ceylonicus* agrees with typical *P. antiphates*, from which it is distinguished by the greyish-black caudal area of the upperside of the hindwing being very much restricted." The larva feeds on *Unona*.

183. PAPILIO NOMIUS, Esper.

Moore as *Pathysa nomius*. Common and frequently abundant in the North Central Province and on the Trincomali side of the Island. It is fond of settling in large numbers together on damp patches of sand. It flies in July and August, and again at the end of the year. It is found also in many parts of India, with a local race, *P. nomius swinhoei*, Moore, from Burma, Indo-China and Hainan Island. The larva feeds on plants of the Natural Order *Anonaceæ*.

184. Papilio jason, Esper.

Moore as *Zetides telephus*, Felder, and *Z. doson*, Felder. *P. jason* is confined to South India and Ceylon; in the latter island it is very abundant in July, August, and at the end of the year in the north and eastern portions in the low country. On November 16th, 1898, the first day of the annual flight, Manders noted that it was migrating in large numbers at Colombo; nearly all the numerous specimens he captured were in a more or less tattered condition though freshly emerged, showing that they had flown a considerable distance; they probably came from the dry district of Hambantota on the south-eastern side of the island. In Northern India *P. jason* is replaced by *P. axion*, Felder, which is found also in Burma, the Malay Peninsula, South-Eastern China, the Andaman Isles, and in the Malay Archipelago. The larva feeds on plants of the Natural Order *Anonaceæ*.

185. Papilio teredon, Felder.

Moore as *Dalchina teredon*. Abundant in the hills, and in the north and eastern portions of the Island in the low country; but is not found in the damp south-eastern district. It is replaced in Northern India and Burma by the parent form, *P. sarpedon*, Linnæus, which is found also in the Malay Peninsula, many of the Malayan Islands, the Loo Choo Islands and in South Japan. The larva feeds on *Cinnamomeum* and many other plants.

186. Papilio agamemnon, Linnæus.

Moore as *Zetides agamemnon*. Usually common and frequently very abundant, especially in the low country and lower hill district of Ceylon, and given to migrating. It has a wide range, being found almost throughout India, in Burma, the Malay Peninsula, Indo-China, and many islands of the Malay Archipelago. The larva feeds on *Magnoliaceæ* and *Anonaceæ*.

Family HESPERIIDÆ.

187. Hantana infernus, Felder.

Apparently confined to Ceylon, where it is not uncommon in the middle hill district in jungle. Its transformations are unknown.

188. CELÆNORRHINUS SPILOTHYRUS, Felder.

Moore as *Plesioneura spilothyrus.* A low hill district insect, common in the neighbourhood of Kandy. Messrs. Elwes and Edwards record it from South India and Java as well as from Ceylon. The larva feeds on *Acanthus.*

189. SARANGESA ALBICILIA, Moore.

Occurs at Trincomali in March and June, at Kandy and at Lagalla, and is widely distributed in the lower hill districts of Ceylon. Mr. Mackwood gives May and June as its months of emergence. It is confined to Ceylon and has not been bred. The late Herr Carl Plötz has described *Antigonus sezendis* from Ceylon in Berl. Ent. Zeitsch., vol. xxix, p. 230, n. 27 (1885); idem, id., Stet. Ent. Zeit., vol. xlvii, p. 112, n. 49*b* (1886). From a coloured drawing kindly made for de Nicéville by Herr G. Weymer from the type specimen in Herr Carl Ribbe's collection, it is quite evident that this species is the same as *S. albicilia. A. sezendis* is omitted by Messrs. Elwes and Edwards from their monograph of the oriental *Hesperiidæ.*

190. COLADENIA INDRANI, Moore.

Moore as *C. tissa*, Moore. Messrs. Elwes and Edwards restrict *C. tissa* to Ceylon, whence it was originally described, noting that "Though otherwise closely resembling the preceding [*C. indrani*], and probably just as variable in colour, may be known in both sexes by the distinct displacement inwards of the middle one of the three pale spots which form the subapical series [of the forewing]. The difference of the male genitalia of the two species are merely those of degree." In a large series of this species in de Nicéville's collection from many parts of India and Burma it is obvious that this character is as inconstant as the other markings, and is quite insufficient to discriminate the two species. *C. indrani* is seasonally dimorphic, true *C. indrani* being the wet, *C. tissa* the dry-season form. In Ceylon it is not uncommon in the lower hill district about Kandy; Mackwood recording it also from Badulla and Kaduganawa. The larva feeds on *Xylia dolabriformis*, Benth., *Grewia microcos*, Linn., and many other plants of different orders, in South India. Herr Carl Plötz has in Berl. Ent. Zeitsch., vol. xxix, p. 225, n. 1 (1885), described this species from Ceylon as *Proteides lankæ*, redescribing it in Stet. Ent. Zeit., vol. xlvii, p. 85, n. 8 (1886). From a coloured drawing of the type in Herr Carl Ribbe's collection made for de Nicéville by Herr G. Weymer, it is evident that this species is the same as *C. indrani. P. lankæ* is not mentioned by Messrs. Elwes and Edwards.

191. TAGIADES OBSCURUS, Mabille.

Moore as *T. distans*, Moore. Originally described by Mabille from "Malay Archipelago, Java?" and by Moore from Ceylon. Mabille's description applies very well to our Ceylon specimens. Moore notes "The Javan *T. obscurus*, Mabille, is nearly allied, but differs in the absence of the discal semi-transparent spots on the forewing." Elwes and Edwards note "Though we have not been able to compare Malayan with Ceylon specimens, yet the absence of the discal spots relied on by Moore for distinguishing his species is a character of no value, the two spots being sometimes absent in Ceylon specimens." In this we concur. In Ceylon *T. obscurus* is common in the low country generally. The larva in South India feeds on *Dioscorea pentaphylla*.

192. TAGIADES ATTICUS, Fabricius.

Not rare in the lower hills, generally in the neighbourhood of water. It has a wide range in India, Burma, the Malay Peninsula and Malay Archipelago. Dr. Christopher Aurivillius in Ent. Tids., vol. xviii, p. 150, n. 71 (1897) points out that there is some doubt about the correct identification of this species. The larva feeds on *Smilax* and *Dioscorea*.

193. TAPENA THWAITESI, Moore.

Originally described from Galle in Ceylon, not met with by Manders, so it must be very rare. Elwes and Edwards record it from Burma, the Malay Peninsula, Sumatra and Borneo, and describe an allied species from the Nilgiris and North Kanara in South India as *T. hampsoni*, the larva of which feeds on *Doris* and *Dalbergia*. *T. thwaitesi* has not been bred.

194. CAPRONA RANSONNETII, Felder.

Moore as *Abaratha ransonneti*. Elwes and Edwards as *C. ransonnettii*. Not uncommon in the low country and about Colombo. It occurs also in South India, the Maldah district of Bengal, Orissa, the Central Provinces, Dehra Dun and Assam. In South India the larva feeds on *Helicteres isora*, Linnæus.

195. GOMALIA ALBOFASCIATA, Moore.

Rare in Ceylon, recorded by Wade in dense jungle between Kirrinde and Werewille beyond Hambantota. Hampson records it from the foot of the Nilgiri Hills, Moore from the Kangra District, Swinhoe from Karachi, and Elwes and Edwards from Quetta. It has never been bred.

196. HESPERIA GALBA, Fabricius.

Not uncommon in Ceylon in the region of heavy rainfall away from the coast. It is probably often overlooked from its small size, obscure coloration and quick flight, on the wing it looks more like a fly than a butterfly. It is found nearly all over India and Burma, and occurs at Aden. The larva in Calcutta feeds on *Sida rhombifolia*, Linnæus, and in South India on *Waltheria indica*.

197. BARACUS VITTATUS, Felder.

Confined to Ceylon, where it is very common in the upper and middle hill districts in grassy open ground, and on the Horton Plains in March. It has never been bred.

198. SUASTUS GREMIUS, Fabricius.

Moore as *S. gremius* and *S. subgrisea*, Moore. The *Hesperia dian* of Kollar (Hügel's Kaschmir, vol. iv, p. 456, n. 6 (1844) described from the "Himalaya" is almost certainly a synonym of this species, but is omitted by Elwes and Edwards. A common low country insect in Ceylon It is found almost all over India and Burma, also in Hong-Kong, Formosa and Hainan. Staudinger records it from Sumatra. The larva feeds on palms.

199. SUASTUS MINUTA, Moore.

Moore as *Tagiades minuta*. It is common at Kandy, and is found only in Ceylon. The *Pterygospidea everyx*, Mabille, Bull. Soc. Ent. Belg., vol. xxvii, p. lxxvii (1883), and *Tagiades everyx*, Mabille, Ann. Soc. Ent. France, vol. lxvi, p. 219, pl. ix, figs. 8*a*, 8*b*, *male* (1887), recorded by the describer from Ceylon and Malacca (*sic*) is a synonym of *S. minutus*. The *Apaustus sinhalus* of Plötz, Berl. Ent. Zeitsch., vol. xxix, p. 228, n. 19 (1885); idem, id., Stet. Ent. Zeit., vol. xlvii, p. 105, n. 1*a* (1886) described from Ceylon, is another synonym. Herr G. Weymer has sent de Nicéville a drawing of the type specimen of the latter in the collection of Herr Carl Ribbe. Neither of these species are given by Elwes and Edwards. It has never been bred.

200. IAMBRIX SALSALA, Moore.

Moore as *Astictopterus stellifer*, Butler. May not the *Hesperia naso* of Fabricius, though described from the Cape of Good Hope, be an older name for this species? Common at Colombo and in the low country generally in open ground. It is found nearly all over India, Burma, the Malay Peninsula, Java, Borneo and Hong-Kong. The larva feeds on bamboo and grasses.

201. TARACTROCERA MÆVIUS, Fabricius.

Moore as *Taractocera mævius.* A very common insect in the low country of Ceylon, but easily overlooked from its small size and jerky flight amongst low herbage. It is very common on Crow Island at the mouth of the Kelani river in the spring and autumn. It occurs in many parts of India and Burma, and in Borneo and Celebes. It has never been bred.

202. AMPITTIA DIOSCORIDES, Fabricius.

Moore as *A. maro*, Fabricius, but *dioscorides* is an older name by five years, *vide* Aurivillius, Ent. Tids., vol. xviii, p. 150, n. 65 (1897). Common in the low and middle hill country of Ceylon in open waste places. It has a wide distribution in India, Burma, the Malay Peninsula, Siam, Sumatra, Java, Bali, Sumba, Sambawa, Celebes, Ceram, Aru, Batjan, Halmaheira, Ké Isles, Hainan Island, and Northern China. The larva feeds on rice and grasses.

203. HYAROTIS ADRASTUS, Cramer.

Not a common insect in the lower and middle hill districts, at Kandy and Punduloya, in April and July. It is common in many parts of India, Burma, Siam, the Andaman Isles, Sumatra, Java, Palawan, the Philippines and Hong-Kong. In Sumatra the larva feeds on the rattan cane, *Calamus* sp.

204. MATAPA ARIA, Moore.

Found at Colombo and Kandy in Ceylon in the low country only and is not common, flying in January and July more especially. It has a wide range, being found in many parts of India, Burma, the Andaman Isles, Sumatra, Nias, Java, Palawan, Bali, Lombok, Hong-Kong and Hainan. The larva feeds on bamboo.

205. GANGARA THYRSIS, Fabricius.

Common in the plains and low country only of Ceylon, at Colombo and Kandy. It has a wide range in India, Burma and Malaya. The larva feeds on palms.

206. PADUKA LEBADEA, Hewitson.

Moore as *Matapa subfasciata*, Moore. Originally described by Hewitson from Borneo. Dr. Moore's figure of his *M. subfasciata* in Lep. Cey. is extremely bad, and the description defective, no mention being made of the remarkable secondary sexual characters on the upperside of the wings in the male. It is a very rare species everywhere, Elwes and Edwards record it from Sikkim, Perak, Java and Pulo Laut, it occurs also in the Andamans, Singapore and Sumatra. Mr. E. E. Green obtained it in Ceylon, but we have no exact records as to where it may be looked for in the island. Dr. Moore briefly describes its transformations, and says that the larva feeds on *Palmaceæ*.

207. NOTOCRYPTA FEISTHAMELII, Boisduval.

Moore as *Plesioneura alysos*, Moore, and *P. restricta*, Moore. Messrs. Elwes and Edwards unite these two species, which, though typically distinct enough, are not constant. It has an immense range in India and Malaya, China, the Loo Choo Islands and Japan. In Ceylon it is not uncommon in the low and middle hill country, particularly so about Kandy and in the Central Province. The larva feeds on *Zinziberaceæ*, *Maranta*, and *Hedychium*.

208. UDASPES FOLUS, Cramer.

A very common insect in the low country of Ceylon. It occurs nearly all over India and Malaya, and in Indo-China, China, Formosa and Hainan. The larva feeds on *Curcuma*.

209. TELICOTA BAMBUSÆ, Moore.

An abundant low country insect in Ceylon, occasionally found in the middle hill district. It has a very wide range in India and Malaya, found also in China, Australia, and the islands of the Pacific. The larva feeds on bamboos and grasses.

210. PADRAONA GOLA, Moore.

Moore as *P. goloides*, Moore. It is widely distributed in Ceylon, occurring from the sea coast up to 5,000 feet, found at Kandy and Colombo commonly from January to March. Its range is almost all over India, China and Malaya to Northern Australia and the Fiji Islands. The larva feeds on soft grasses.

211. PADRAONA DARA, Kollar.

Moore as *P. pseudomæsa*, Moore, and *P. mæsoides*, Butler. Occurs commonly nearly all over Ceylon, from the plains up to 5,000 feet. Common all over India, Malaya and the Pacific, and found in China and Japan. The larva feeds on bamboos. M. Paul Mabille appears to have redescribed this species from "Java, Ceylon, and perhaps the neighbouring Islands" as *Pamphila taxilus* in Ann. Soc. Ent. Belg., vol. xxi, p. 38, n. 147 (1878). As far as the description reveals it agrees with *P. dara*, and is placed by Messrs. Elwes and Edwards as a synonym of that species.

212. HALPE CEYLONICA, Moore.

We have no exact records of the occurrence of this species in Ceylon, though Messrs. Elwes and Edwards give it from thence and from the Nilgiris. *H. moorei*, Watson, recorded by those gentlemen from Calcutta, the Khasi Hills, Burma, Trichinopoli and the Andaman Isles, is very doubtfully distinct from *H. ceylonica*, Messrs. Elwes and Edwards saying that the discal band on the underside of the hindwing in *H. moorei* is white, in *H. ceylonica* is yellowish-white, that it appears on the upperside in an indistinct suffused pale patch in *H. moorei*, but is absent in *H. ceylonica*. These two characters appear to us to be insufficient to separate the two species, *H. ceylonica* being obviously a variable insect. Should they be proved to be one, Moore's name will stand for the butterfly. Moore records *H. ceylonica* from Mergui, captured in January and March. It has not been bred.

213. HALPE EGENA, Felder.

Moore as *H. brunnea*, Moore. Originally described from "Kallupahani, Ceylon, 15th December." There is no doubt in de Nicéville's mind that *H. brunnea* equals *H. egena* as Dr. Moore suggests. *H. egena* is not mentioned by Messrs. Elwes and Edwards. Herr Plötz records it from Ceylon, to which island it appears to be confined, but we do not know exactly where it is found. In de Nicéville's collection is a single male from Punduloya, Moore described it from a single female example, Elwes and Edwards have seen a single pair, so it must be very rare. It has not been bred.

214. HALPE DECORATA, Moore.

A rare low country insect in Ceylon, to which Island it is restricted; recorded by Moore from Galle and Morowaka, and by Elwes and Edwards from Awissawella, all on or near the coast. In de Nicéville's collection are specimens from Densworth, Awissawella, taken in July by Mr. Thomas B. Butt. It has never been bred.

215. BAORIS OCEIA, Hewitson.

Moore as *B. penicillata*, Moore. In Ceylon it is a very common low country insect. It is found in many parts of India, Burma, the Andaman Isles, the Malay Peninsula, Sumatra, the Philippines and China. The larva feeds on bamboo.

216. CHAPRA MATHIAS, Fabricius.

Moore as *C. mathias* and *C. agna*, Moore. Widely distributed and abundant generally in Ceylon, especially so in the low country. Its habitat may be said to be Southern Asia from Syria on the west to

China and Japan on the east, and throughout Malaya to Australia. It is found also in Arabia. The larva feeds on rice and grasses.

217. PARNARA PHILIPPINA, Herrich-Schäffer.

Moore as *Baoris seriata*, Moore. This species is common at low elevations in Ceylon and about Kandy. It may always be known according to Messrs. Elwes and Edwards' definition in both sexes by having no spots in the discoidal cell of the forewing, but always with a spot placed anterior to and touching the submedian nervure of that wing, in the next species the latter is wanting. Moore's figure of the female of *Baoris kumara* (Lep. Cey., vol. i, pl. lxix, fig. 2*a*) applies to *P. philippina*. Dr. A. Pagenstecher in Jahr. des Nass. Ver. für Natur., vol. xxxvii, p. 207, pl. vii, fig. 1, *female* (1884) has described from Amboina and Ceylon a *Pamphila larika*, which the late Herr Carl Plötz also records from both islands. This species is almost certainly the same as *P. philippina*. *P. larika* is not referred to by Messrs. Elwes and Edwards. Herr J. Röber records *Pamphila larika*, Pagenstecher, from Key, and redescribes it, proposing for it the name of *Pamphila subfenestrata* if distinct (*vide* Tijd. voor Ent., vol. xxxiv, p. 321 (1891). Mr. de Nicéville has received about 60 specimens of *P. philippina* from the Ké Archipelago, some of which agree with Herr Röber's description. It is a most variable species, and has been found in many parts of India, in Burma and Malaya as far east as the Ké Archipelago at any rate, and has also been recorded by Ribbe from the Pacific. It does not appear to have been bred.

218. PARNARA KUMARA, Moore.

Moore records this species from Kandy. We have no specimens of it from Ceylon, nor do Messrs. Elwes and Edwards record it from thence, but give it from the Nilgiris, Sikkim, Java and Borneo. It is doubtfully distinct (at any rate superficially, the prehensores as figured by Elwes and Edwards are distinct enough) from the last-named we think: *P. philippina* in the older name of the two. The larva feeds, according to Aitken, on rice, on bamboo according to Bell.

219. PARNARA CONJUNCTA, Herrich-Schäffer.

Moore as *P. narooa*, Moore. We have no specimens from Ceylon, and Moore gives no exact locality for it. It occurs in many parts of India, Burma, the Malay Peninsula, the Andamans and Nicobars, Sumatra, Nias, Java, Borneo, Lombok, Sumba, Sambawa, the Philippines, and Hong-Kong. Moore describes the larva but does not give its food-plant; Bell says it feeds on long grasses. A synonym of this species not given by Elwes and Edwards is the *Hesperia alice*, Plötz, Stet. Ent. Zeit., vol. xliv, p. 45, n. 320 (1883), described from Mergui in Lower Burma and the Philippines. Herr George Weymer has kindly sent de Nicéville a coloured drawing of the type in the Berlin Museum.

220. PARNARA GUTTATUS, Bremer and Grey.

Moore as *P. bada*, Moore, who records it from Colombo. It is a common low country insect in Ceylon and has a wide range in India, China, Japan and Malaya. *Hesperia kolantus*, Plötz, Berl. Ent. Zeitsch., vol. xxix, p. 227, n. 13 (1885), and Stet. Ent. Zeit., vol. xlvii, p. 97, n. 316c (1886), described from India, is another synonym of this species not given by Elwes and Edwards. Herr G. Weymer has sent de Nicéville a coloured drawing of the type specimen in Herr Carl Ribbe's collection. The larva of *P. guttatus* feeds on rice and grasses.

221. PARNARA COLACA, Moore.

Moore as *P cingala*, Moore. We have no exact locality for this species from Ceylon, and Moore gives none. It is found in many parts of India, the Andamans and Nicobars, and several of the Malayan islands. The larva feeds on *Graminaceæ*—grasses and rice.

222. ISMENE ATAPHUS, Watson.

Moore as *I. œdipodea*, Swainson. Recorded by Moore from Kandy, Balangada, and near Trincomali, scarce. It is found also in the Himalayas, Assam and Burma. The larva feeds on *Hiptage*.

223. HASORA BADRA, Moore.

Recorded by Moore from the Kottawa forest, rare. We have specimens from Ceylon but without exact locality. It is found in many parts of India, Burma, the Andamans, the Malay Peninsula, Sumatra, Nias, Java, Borneo, Bali, Lombok, Engano, Sumba, Sambawa, Celebes, the Philippines and China. It has not been bred.

224. PARATA ALEXIS, Fabricius.

Moore as *P. chromus*, Cramer. Widely distributed in Ceylon, found from the plains up to 6,000 feet. It has a wide range in India, is found in Burma, the Andamans, Java, Borneo, Pulo Laut, and Hong-Kong. The larva feeds on *Pongamia* and *Heynia*.

225. PARATA BUTLERI, Aurivillius.

Hasora butleri, Aurivillius, Ent. Tids., vol. xviii, p. 150, n. 68 (1897).

Moore as *P. alexis*, Fabricius. This species differs from *P. alexis*, Fabricius, in having the discal white band on the underside of the hindwing very broad and well defined. It is found in the low country and up to 6,000 feet elevation; we have specimens from Colombo taken in June, and Trincomali taken in September and November. The larva has been reared on a climber, *Rourea* or *Derris*, in South India, where alone in addition to Ceylon it is found. Messrs. Elwes and Edwards sink this species as a synonym of "*Hasora*" *chromus*, Cramer.

226. BIBASIS SENA, Moore.

Rare in Ceylon, recorded from Kandy. It is found also in South India, the Western Himalayas, Sikkim, Assam and Siam. The larva feeds on *Combretum* and *Hiptage*.

227. BADAMIA EXCLAMATIONIS, Fabricius.

A common low country insect; found also in the middle hill district of Ceylon. It has an immense range, occurring throughout India, in China, Malaya to Australia and in the South Sea Islands. The larva feeds on *Terminalia*, *Ficus*, *Linociera*, and *Combretum*.

228. RHOPALOCAMPTA BENJAMINII, Guérin.

Moore as *Choaspes benjamini*. Not uncommon in the middle hill district of Ceylon from May to November, but difficult to capture in good condition. It is found also in South India, the Himalayas, Assam, Burma, Indo-China, China, Japan and Borneo (*Druce*). Dr. Moore describes the larva, but does not mention its food-plant. In India it feeds on *Sabia* and *Meliosma*.

The late Herr Carl Plötz in Berl. Ent. Zeitsch, vol. xxix, p. 226, n. 7 (1885), and in Stet. Ent. Zeit., vol. xlvii, p. 92, n. 93*c* (1886), described a *Hesperia taprobanus* from Ceylon. Herr G. Weymer has sent de Nicéville a coloured drawing of the type specimen in Herr Carl Ribbe's collection, from which it appears to be the same species as *Zea mythecoides* from Celebes described by de Nicéville in Journ. Bomb. Nat. Hist. Soc., vol. xii, p. 157, n. 23, pl. AA, figs. 33, *male*; 34, *female* (1898). Herr Weymer notes that the species occurs at Tombugu in East Celebes. It is certainly not a Ceylonese species, and de Nicéville's name will stand for it, as Taprobana being the ancient name for Ceylon is misleading. Messrs. Elwes and Edwards do not mention this species in their monograph.

Again, Herr Plötz in Stet. Ent. Zeit., vol. xlvii, p. 106, n. 45*b* (1886), described *Apaustus luteipalpis* from Ceylon. As far as his poor description goes it applies to the female of *Iambrix salsala*, Moore, (No. 200 *ante*) and is probably that species. *A. luteipalpis* is not given by Messrs. Elwes and Edwards.

On a new Genus of Butterflies from Western China allied to Vanessa.—*By* Lionel de Nicéville, F.E.S., C.M.Z.S., &c.

[Received 30th November; Read 6th December, 1899.]

Genus Lelex, nov.

Differs from *Vanessa*, Fabricius, and *Pyrameis*, Hübner, the type of both being *Papilio atalanta*, Linnæus, in having the *palpi* very much shorter, hardly extending in front of the head, the *antennæ* also considerably shorter, with a larger club, the FOREWING with the second subcostal nervule given off a little beyond the apex of the discoidal cell instead of before its end, the HINDWING with the anal angle rounded instead of produced; otherwise similar to *Vanessa*. Type, *Vanessa limenitoïdes*, Oberthür.

Lelex limenitoïdes, Oberthür.

Vanessa limenitoïdes, Oberthür, Et. d' Ent., vol. xiii, p. 39, pl. ix, fig. 96 (1890); id., Leech, Butt. China, Japan, and Corea, vol. i, p. 254 (1892).

Habitat: Tsé-Kou (*Oberthür*), Ta-chien-lu (*Leech*), both Western China.

I am indebted to M. Charles Oberthür for the gift of a single male of this remarkable butterfly from Tsé-Kou, captured in 1895 by M. R. P. Dubernard. Mr. Leech wrote of it "As its characters are not exactly those of a *Vanessa* it is probable that a new genus will have to be created for the reception of this insect." Not only does it differ widely in the form of the palpi, the length of the antenna with its larger club, and in the neuration of the forewing, but also in its coloration, there being no *Vanessa* except *V. antiopa*, Linnæus, (genus *Euvanessa*, Scudder), which is black with creamy-white markings, the disposition of the markings being, however, wholly different in the two species.

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XVII.—*The relationship of the water-supply, water-logging, and the distribution of* Anopheles *Mosquitos respectively, to the prevalence of Malaria north of Calcutta.*—*By* Leonard Rogers, M.D., M.R.C.P., I.M.S., *Professor of Pathology, Medical College.*

[*With a Map.*]

[Received and read 4th July, 1900.]

The tract of country in which the present inquiry was carried out extends along the East bank of the Hooghly river from Calcutta to Naihati, a distance of 25 miles. The area is fairly typical of Lower Bengal, and has for a long time been looked on as water-logged and very malarious. In 1889 Dr. Gregg, then Sanitary Commissioner of Bengal, after a careful inspection, came to the conclusion that the unhealthiness was due to certain drainage channels having been silted up, and a scheme for re-excavating some of them was prepared, but has not yet been carried out. Owing to an unusual prevalence of fever in 1899 a further inquiry into the health of the tract was ordered, and was carried out by me in February last.

The plan of the enquiry was as follows. As the essential point to be determined was the proportion of the inhabitants of the various parts of the area who were suffering from malaria, a large number of persons were examined for enlargement of the spleen; its size being noted as either just felt, two fingers breadth below the ribs, four fingers breadth below, or extending beyond the navel. The spleen-count as a test for the degree of malaria in a tract of country was used by Major Dyson in the Punjab in a similar inquiry, and by others, and is perhaps the most reliable and easily carried out method, especially in the season of the year when fever is at a minimum. Secondly, the level of the ground-water was taken in as many wells as possible, and inquiries were made as to the height to which the ground-water rose during the rainy season, so as to enable the degree of water-logging to be estimated. Thirdly, the drinking-water supply was carefully noted. Fourthly, the number of fever cases treated at various dispensaries month by month was compared with the monthly rainfall over a series of years, and worked out in charts, in order to ascertain the influence of seasons and rainfall on the fever rate. Lastly, some observations have been made on the distribution and monthly variations of the distribution of the *Anopheles* Mosquitos, which have furnished some rather surprising results.

In carrying out the spleen-count the whole area was divided up into thirteen Municipalities, and as far as possible 100 persons, about half of whom were children, were examined in each Ward of each Municipality, over 5,000 persons having been examined in all. As children suffer from enlarged spleen more commonly than adults, just as Koch has recently shown that the malarial organism is also found in a larger percentage of children, the figures have been corrected so as to represent the spleen rate of 50 children and 50 adults in each Ward, so that the figures of the different areas should be strictly comparable. Visits were made from house to house so as to get a fair sample of the actual inhabitants of the Wards, and every precaution was taken to obtain accurate results, every single person being examined by myself, a month being taken over the inquiry.

The results are embodied in the accompanying map, in which the different municipal areas are shaded in accordance with the percentage of persons who were found to have enlarged spleens, the darker areas representing the highest percentages and *vice versâ*. The dotted lines within the municipal areas enclose the Wards or areas separately examined, and the large figures within them indicate the spleen percentage, while the figures enclosed in a circle are those of the distance of the ground water-level below the surface in feet and inches, the upper figures being the distance in the dry cold weather taken in the month of February, while the lower ones indicate the distance during the height of the previous rainy season. The small figures in brackets refer to the number of the Wards given in the left-hand margin of the map, and correspond with those in the tables given further on.

THE GENERAL RESULTS OF THE SPLEEN-COUNT.

The following table shows the percentage of people who were found to be suffering from enlarged spleen in each Municipality. They are arranged in order from above downwards as they are situated on the map from north to south, while the westernly ones, which lie on the east bank of the Hooghly, are placed on the left, and the easternly ones, which are at a little distance from the river, are placed in the right-hand column, so that the table roughly represents their position on the map.

TABLE I.

Municipality.	Spleen percentages.	Municipality.	Spleen percentages.
Naihati	19·9	(Gobardanga)	(55·5)
Bhatpara	20·0		
Garulia	33·8		
North Barrackpore ...	36·5	(Busirhat)	(52·8)
Titagarh	37·8	Baraset	52·9
South Barrackpore (West)	25·2	South Barrackpore (East)	56·0
Kamarhati (West) ...	18·8	Kamarhati (East) ...	34·8
Baranagar	17·8	North Dum Dum ...	68·1
Chitpore-Cossipore ...	11·2	South Dum Dum ...	32·3
		Maniktolla	13·2
Average	24·5	Average	41·0

A glance at the above table or at the shaded map will show that the places situated on the bank of the Hooghly river have a much lower spleen percentage than those further to the east, even when the latter are but two miles from the river as in the case of the last five in the right-hand column of the table, with the exception of part of North Dum Dum. This having been ascertained, the question arose whether the lower rate on the banks of the Hooghly was to be regarded as the normal rate, and the higher figures of the inner tract as being due to water-logging or other abnormal conditions, or whether the latter must be taken as the usual state of affairs in this part of Lower Bengal, and the banks of the Hooghly as being exceptionally healthy. In order to solve this problem it was necessary to visit other places still further to the east, and Gobardanga and Basirhat, which are situated on the next flowing river to the east of the Hooghly, namely, the Ichahamati, were selected as the most suitable for the purpose. The former is some 20 miles to the east of Naihati, while the latter is 26 miles to the east of Baraset. The former is nearly surrounded by a bend of the river on two sides and by marsh land on the other sides, so that cannot be considered to be well situated from the health point of view, but Basirhat, on the other hand, would appear to be likely to be as healthy as any place in this portion of the Gangetic delta. Nevertheless, both show a spleen-rate of over 50 per cent., which, agreeing as it does with Dr. Gregg's statements about this tract of country, may be taken as approximately the normal figure for this part of Lower Bengal. It would, therefore, appear that the east bank of the Hooghly is exceptionally healthy, although some of the Municipalities in the low-lying tract a little to the east of the river show very high spleen-rates, more especially North Dum Dum and the portion of South Barrackpore to the east of the railway, whose figures are 68 and 56 per cent. respectively. It may also be at once mentioned that last year, namely, 1899, was an exceptionally feverish one on account of the excess and uneven distribution of the rainfall.

On looking more closely at the figures it will be observed that there is one marked exception to the rule above pointed out, for Maniktolla, although situated away from the river-bank and on extremely low-lying and water-logged land, has, nevertheless, the second lowest spleen-rate; an exception which has proved to be the key to a very important factor in the causation of the variations of the spleen-rate in the tract under consideration. The only ground on which the low spleen-rate of Maniktolla can be accounted for is the enjoyment by this advanced Municipality of a good filtered water supply. It is also worthy of note that Chitpore-Cossipore, which has the lowest rate of all, namely, 11·2, has the double advantage of a filtered water supply and a situation on the east bank of the Hooghly. That these are the true reasons of its marked immunity is shown by the fact that the average rate of the two western Wards is only 7·4, while that of the two easternly Wards, situated from one to two miles from the river, is 14·7, that is almost the same as that of Maniktolla. The density of the population of Chitpore, and consequent smaller number of tanks, etc., may also be a slight factor in its healthiness, but the details to be given immediately with regard to the spleen-rates of different parts of Maniktolla and other places show that this is not a factor of any great importance, but on the other hand they will prove conclusively the intimate relationship between a filtered water-supply and a low spleen rate, but as this point is one of the utmost practical importance it will be necessary to go somewhat into detail with regard to the spleen-rates of different Wards of the same Municipalities, more especially of those parts of which are being supplied with good water by mills situated within their boundaries. At the same time the data with regard to the ground water-levels will be given, so that the question of water-logging can also be discussed.

WARD VARIATIONS IN THE SPLEEN-RATES. 1. MANIKTOLLA.—This Municipality, as will be evident from the accompanying map, is situated between the Circular and the New Cut Canals, and this area is so flat that there is only a fall of some eight feet from west to east in a distance of two miles. Its drainage is dependant on channels by the sides of the four main roads, and is carried under the New Cut Canal by means of siphons into the Great Salt Water Lake, but these have to be closed at high tides to prevent the salt water running up into the drains, and they do not work very efficiently at present. The portion of the main drains in the western and more densely populated portion of the Municipality are brick-lined, but the eastern portions are of earth only. The water-level was taken in several wells, and in February it was found to average 5 feet from the surface of the ground, while evidence was obtained that it rises to within from one to two feet during the rainy season. A more typically water-logged place it would be difficult to find. For purposes of comparison it was divided up into western and eastern portions, and the spleen-rates were found to be 12·4 for the former and 14 for the latter, although it might have been expected that the less densely inhabited and more water-logged eastern portion would have had a decidedly higher rate. It was in the west part of this Municipality also in which the larvæ of the malarial-bearing mosquito was found in from half to two-thirds of the tanks as well as in some other pools, as will be detailed further on, so that none of the known causes of malaria were absent, in spite of which this Municipality, together with that of Chitpore and Cossipore, were the two which showed considerably the lowest spleen-rates of all the thirteen, and these two are the only ones which have a full filtered water supply.

The following table shows the above figures in a convenient form.

TABLE II.

MANIKTOLLA.

Area.	Gound Water-Level. Feb., 1900.	Gound Water-Level. Rains, 1899.	Water-supply.	Corrected Spleen percentages. Adult Males.	Children.	General Total.
West part (1)	5 ft.	1 to 2 ft.	Filtered.	13	11·8	12·5
East (2)	5 ft.	2 ft. 6 in.	do.	13	15·0	14·0

CHITPORE-COSSIPORE.—This Municipality is situated immediately to the north of Calcutta, and extends eastwards as far as the Eastern Bengal Railway and northwards to the southern border of Baranagar. It is divided into four Wards, namely, Chitpore and Cossipore West extending from the river to the Grand Trunk Road, the spleen percentages of which are 4·8 and 9·9 respectively; and Chitpore and Cossipore East, extending from the Grand Trunk Road to the Railway, and consequently distant from one to two miles from the river bank, the spleen-rates of which are 13 and 16·75 per cent. respectively. The whole area is supplied fully with filtered water, while those people who do not drink this (and they are certainly a decided minority) will take chiefly river water in the western Wards, and tank water in the eastern ones. The water-level in three wells varried only between 4 and 5 feet from the surface in February, and in the rainy season it had been within from 1 to 2 feet of it; so that here again there was considerable water-logging but the minimum amount of fever, while although the western portion is more densely populated, the eastern part presents numerous tanks, and is generally favourable to the developement of malaria, yet, apparently owing to the filtered water-supply, the spleen-rate is very low.

TABLE III.

CHITPORE-COSSIPORE.

Area.	Ground Water-Level.		Water-supply.	Corrected Spleen percentages.		
	Feb., 1900.	Rains, 1899.		Adult Males.	Children.	General Total.
Chitpore, West (3)	4 ft. 3 in.	1 ft.	Filtered.	2·05	7·7	4·85
Cossipore, West (4)	4 ft. 9 in.	2 ft. 9 in.	do.	10·6	9·3	9·95
Chitpore, East (5)	5 ft. 1 in.	2 ft.	do.	16·0	10·0	13·00
Cossipore, East (6)	......		do.	18·3	15·2	16·75

SOUTH DUM DUM.—To the east of the railway, which bounds the Chitpore-Cossipore Municipality, lies South Dum Dum, the most thickly inhabited portions of which are situated on the Jessore, Belgatia and Dum Dum roads, and it is divided into three Wards, which may roughly be taken as respectively including the parts adjoining these three roads. The inhabitants of Ward II who were examined mostly resided near the easternmost portion of the Dum Dum road, and the spleen rate was 37·9. Those of Ward I. mostly lived around that portion of the Jessore road which joins the eastern ends of the Belgachia and Dum Dum roads, and its spleen-rate was 45·3. Lastly, most of those examined in Ward III. lived around the western end of the Belgachia road just to the east of the railway, and consequently close to the Western Ward of Cossipore, and the spleen-rate among them was only 13·7, by far the lowest rate of any place to the east of the railway. Here again the probable explanation of this exception is that many of the inhabitants of this Ward obtain filtered water from the Cossipore Municipality as I ascertained both by inquiry and by seeing them carrying the water myself, while the portion of the other Wards which were examined were too far from Cossipore for the people to resort there for water to any extent. The conditions favourable to malaria are very similar in each Ward, for the Bajulla Khal flows right through Wards II. and III. as a broad swampy track with little or no current except during the rainy season, while the tide flows up it from the Salt Water Lakes at high water, there being no sluice gate where it passes through the bund, while part of the houses of the Municipality are surrounded by rice fields. The water-level in a well in Ward I. was 8 ft. 9 in. below the surface in February, while during the previous rainy season it had risen within 9 inches of the ground, when the water could be dipped out by hand without the use of any rope, so that there is no doubt about this Municipality being very water-logged.

TABLE IV.

South Dum Dum.

Ward.	Ground Water-Level.		Water-supply.	Corrected Spleen percentages.		
	Feb., 1900.	Rains, 1899.		Adult Males.	Children.	General Total.
I. (7)	8 ft. 9 in.	1 ft.	Tank.	41·8	48·8	45·3
II. (8)	...	...	do.	35·4	40·4	37·9
III. (9)	...	...	Partly filtered.	11·8	15·6	13·7

Baranagar.—This Municipality lies between the Hooghly and the Eastern Bengal Railway, extending northwards for nearly two miles above Cossipore. It is divided into four Wards, the first three of which are between the river and the Grand Trunk Road, and the fourth lies to the east of the former, being mostly between the Grand Trunk Road and the railway, and consequently is dependant for its water-supply on tanks, while the first three get theirs mainly from the river, although Ward I., which is the most southernly bordering on Cossipore, obtains a certain amount of filtered water from that Municipality. Ward I. has the lowest spleen-rate, it being only 11·6, Wards II. and III. have intermediate rates of 14·3 and 18·1 respectively, while Ward IV. has the highest rate, namely, 26; differences which can only be explained by the varying water-supply, for although the last Ward also has a larger area under rice cultivation, that portion of it, whose inhabitants were examined, did not present materially different conditions from the other three Wards. Nor will the differences in the ground water-level, which are given in the Table below, account for those of the spleen-rates.

TABLE V.

Baranagar.

Ward.	Ground Water-Level.		Water-supply.	Corrected Spleen percentages.		
	Feb., 1900.	Rains, 1899.		Adult Males.	Children.	General Total.
I. (10)	7 ft. 7 in.	4 ft.	River and Tank & some filtered.	15·0	8·3	11·6
II. (11)	4 ft. 1 in.	2 ft.	River and Tank.	12·3	16·3	14·3
III. (12)	7 ft. 6 in.	3 ft.	do. do.	22·9	13·4	18·1
IV. (13)	...	...	Tank only.	14·6	37·3	26·0

Kamarhati.—This Municipality lies immediately to the north of Baranagar, and consists of two Wards, namely, No. I. between the river and the Grand Trunk Road, and No. II. from the latter up to the Eastern Bengal Railway, and including Belguria. The spleen-rate of the river Ward was found to be 18·8, while that of the inland Ward was 34·8, a notable difference, while the first Ward mainly relies on the river for its water-supply, and the latter is dependant on tanks; for although there are a few wells in all the municipalities, mostly belonging to private individuals, yet they appear from my inquiries to be little if at all used by the people for drinking purposes, especially if filtered water is available, while many intelligent natives informed me that those who drank filtered water suffered much less than those who drank that from any other source, including well water. The ground water was 7 feet below the surface in February in the riverine Ward, and had been within 1 ft. 8 in. of it in the rainy season of 1899, while it was 1 foot further down in both seasons in the case of the eastern Ward, so that from this point of view the latter should have been slightly the more healthy of the two, instead of entirely the reverse obtaining.

TABLE VI.

Kamarhati.

Ward.	Ground Water-Level. Feb., 1900.	Ground Water-Level. Rains, 1899.	Water-supply.	Corrected Spleen percentages. Adult Males.	Children.	General Total.
I. (14) West	7 ft.	1 ft. 8 in.	River and Tank.	17·3	20·4	18·8
II. (15) East	8 ft.	2 ft. 8 in.	Tank only.	32·5	36·6	34·8

North Dum Dum.—This Municipality is situated to the east of Kamarhati, and extends from the railway to Nowi Nadi, a distance of some four miles, and it consists for the most part of rice fields surrounding several villages. It contains two Wards, the westernly of which includes the large village of Nimta, while the easternly one includes Gouripur and Kadihati, which are situated on the Nowi Nadi, a sluggish stream which carries the surface drainage away to the south-east into the Kocho bhil. The water-level in a well in the western Ward was 7 ft. 3 in. below the surface in February, and had risen to within 2 ft. 3 in. in the rainy season of 1899, so that this part is certainly water-logged. The spleen-rate in the western Ward was no less than 76·6 per cent., while among 58 boys of the Nimta High School, who mostly belonged to well-to-do families, it was 67. In the eastern Ward the percentage worked out at 59·6, which is also very high, the average of the two Wards being 68·1; an extremely high figure. The water-supply is solely from tanks and a very few wells, while the villages are surrounded by flooded rice fields during the rainy season; both a bad water-supply and water-logging being present and factors in causing the marked unhealthiness of this area.

TABLE VII.

North Dum Dum.

Ward.	Ground Water-Level.		Water-supply.	Corrected Spleen percentages.		
	Feb., 1900.	Rains, 1899.		Adult Males.	Children.	General Total.
Western (16)	7 ft. 3 in.	2 ft. 3 in.	Tank	73·3	80·6	76·6
Eastern (17)	...	...	do.	56·6	62·5	59·6

South Barrackpore.—This Municipality is a very large and scattered one, mainly consisting of a riverine portion situated between the Hooghly and the Grand Trunk Road, the following four Wards of which (beginning from the south) were examined, namely; Agarpara, with a spleen-rate of 30·8 and a ground water-level of 7 ft. in February and 1 ft. 8 in. below the surface in the rains of 1899: Punihati, with a spleen-rate of 31·25: Sukchar, with a spleen-rate of 12·1 and a ground water-level of 8 ft. in February, and 2 ft. below the surface in the rains of 1899: and Khardaha, situated just to the south of the khal of the same name, with a spleen-rate of 26·75 and a ground water-level of 6 ft. 6 in. down in February. All these depend mainly for their water-supply on the river, while the exceptionally low rate of Sukchar appears to be due to the unusual number of good pukka houses, many of which are two stories high, the inhabitants of which must have been much better to do than the majority of those in most of the other Wards, while tanks are also fewer than usual in this Ward.

This Municipality also includes a large area of rice land with scattered villages to the east of the Grand Trunk Road, and extending across the Eastern Bengal Railway. Two portions of this were examined, namely, one to the east of Punihati and Sukchar, consisting mainly of the village Sodepore on either side of the Eastern Bengal Railway, but mostly to the east of it, and another village called Natagore to the east of the former. The spleen-rate of this area was 60·4, that of Sodepore having been 61·7, and that of Natagore 64·4. The ground water-levels in February were 10 ft. 6 in. and 9 ft. respectively, and in the rainy season of 1899, 2 ft. and 4 ft. below the surface, measurements which, it will be observed, are very similar to those of the riverine portions of this Municipality, the slight difference being in favour of the inland portions, although their spleen-rates are very much higher than those of the parts on the banks of the

Hooghly, so that the water-levels do not help in explaining the difference. On the other hand, the dwellers near the river will mostly drink river water, while those who live more inland are entirely dependant on tank water. The other part of the South Barrackpore Municipality which was examined lies to the east of the railway opposite North Barrackpore, and consists of the villages of Chandanpukuria and Nona. The spleen-rate was found to be 51·6, while the ground water-level was 10 ft. 4 in. below the surface in February, but had risen to within 5 ft. during the rains of 1899, figures which are much more favourable than those of Maniktolla and Chitpore-Cossipore, which have the lowest spleen-rates. This, the most north-easternly Ward of the South Barrackpore Municipality, is also dependant on tank water for its drinking supply. The much lower spleen-rate, then, of the parts near the river, as compared with those at a distance of two miles or more from it, is again borne out by this Municipality, the figures of which are given in the table below.

TABLE VIII.

SOUTH BARRACKPORE.

Area.	Ground Water-Level. Feb., 1900.	Ground Water-Level. Rains, 1899.	Water-supply.	Corrected Spleen percentages. Adult Males.	Corrected Spleen percentages. Children.	Corrected Spleen percentages. General Total.
Agarpara (18)	7 ft.	1 ft.	River and Tank	33·3	28·5	30·8
Punihati (19)	...	...	do. do.	20·0	42·5	31·2
Sukchar (20)	8 ft.	2 ft.	do. do.	19·3	6·9	12·1
Khardaha (21)	6 ft. 6 in.	...	do. do.	32·5	21·0	26·7
Sodepore (22)	9 ft.	4 ft.	Tank only.	50·0	70·9	60·4
Nona (23)	10 ft. 4 in.	5 ft.	do.	36·5	66·8	51·6

TITTAGHAR.—This is a small Municipality which lies on the east bank of the Hooghly between South and North Barrackpore, and is bounded on the south by the Khardaha Khal, and on the north by the Tittaghar Khal, and on the east by the Grand Trunk Road. It is divided into four Wards numbered I. to IV. from north to south. Two Mills in Wards II. and III. supply a limited amount of filtered water more especially to the inhabitants of Ward II., but Wards I. and IV. on either side of the other two drink nearly entirely river and tank water. Here, then, was a very good opportunity of putting to a crucial test the question as to whether filtered water drinkers suffer less from enlargement of the spleen than do those who drink other kinds, so notes were made regarding nearly all of the people examined in this Municipality as to what water they usually drunk, whether filtered, Hooghly, or tank.

The results are as follows, beginning from the south as before. Ward IV., which is a narrow strip situated on the north bank of the Khardaha Khal, up to which the tidal water flows as far as a sluice gate in a bridge under the Grand Trunk Road, and which contains a series of bustees, had a spleen-rate of 48 per cent., that is a high one for a riparian area. The water-level was 10 ft. 1 in. below the surface in February, but had risen to within 1 ft. 3 in. in the rains of 1899. Only 16 per cent. of those who were examined stated that they drank filtered water. In Ward III. 32 per cent. of those examined had drunk filtered water, and the spleen-rate was 30 per cent. The water-level had been 1 ft. 6 in. below the surface in the rains of 1899, and was 10 ft. 3 in. down in February, so that in this respect the conditions were just the same as in Ward IV., so this factor will not explain the considerable difference between the health of these two Wards; the water-supply only being different. Still more marked, however, was the difference between the spleen-rates of the two northern Wards, that of Ward III., which is opposite the Mills, being 19 per cent., and that of Ward IV. immediately further north, was 54·3; in spite of the ground water-level of the latter having been 6 ft. from the surface at the height of the rains of 1899, and 18 ft. 4 in. down in February last; an exceptionally low rate. On the other hand, the number of the people examined in Ward III. who had drunk filtered water was no less than 82·5 per cent., while only 19·6 of those of the Ward I. stated that they drunk filtered water, and owing to their greater distance from the supply they were probably less regular in obtaining it than were the inhabitants of Ward II. at whose doors it was placed. These figures are sufficiently striking, especially as they confirm the data obtained in several other municipalities, to be given immediately, and they are also in entire agreement with the following results of the differences in the spleen-rate among the drinkers of the different kinds of water in this Municipality. Thus among 140 filtered water drinkers, 37, or 26·4 per cent., had enlarged spleens; while among 179 river water drinkers 74, or 41·3 per cent., were similarly affected; but of 55 tank water drinkers no less than 33, or 67·2 per cent., had enlargement of this organ. Further, if we take the degree of enlargement among the different classes as detailed in Table IX, below, we find that of those who had enlarged spleens the degree of enlargement was very slight in 62 per cent. of the filtered water drinkers, in 43·2 per cent. of the river water drinkers, but only in 27 of those who drank tank water, it being considerable or very enlarged in the remainder. Not only, then, is the percentage of enlarged organs much greater in those who drank unfiltered water (the percentage of mixed river and tank water drinkers being 47·4), but the degree of enlargement of the organ was also much more marked in the latter classes as compared with the filtered water drinkers. (See Table X.).

TABLE IX.

TITTAGARH.

Ward.	Ground Water-Level. Feb., 1900.	Ground Water-Level. Rains, 1899.	Water-supply.	Corrected Spleen percentages. Adult Males.	Children.	General Total.
IV. (24)	10 ft. 1 in.	1 ft. 3 in.	River and Tank.	36·0	60·0	48·0
III. (25)	10 ft. 6 in.	1 ft. 6 in.	do. but ⅓ of them drank filtered water.	29·2	30·8	30·0
II. (26)	...	...	do. but 82°/o drank filtered water.	19·0	18·9	19·0
I. (27)	18 ft. 4 in.	6 ft.	River and tank water.	51·3	57·4	54·3

TABLE X.

SPLEEN ENLARGEMENT AND WATER-SUPPLY IN TITTAGARH.

	Filtered water.	River water.	Tank water.	Total.
Spleen not enlarged	103·0	105·0	18·0	226·0
Spleen slightly enlarged.	23·0 (62°/o)	32·0 (43°/o)	10·0 (27°/o)	65·0
Spleen considerably enlarged.	9·0 (24°/o)	26·0 (36°/o)	15·0 (40·5°/o)	50·0
Spleen markedly enlarged.	5·0 (13°/o)	16·0 (21°/o)	12·0 (32·7°/o)	33·0
Total examined ...	140	179	55	37·4
Percentage with enlarged spleens.	26·4	41·3	67·2	39·5°/o

NORTH BARRACKPORE.—This is a small Municipality on the east bank of the Hooghly extending from the Tittaghar Khal on the south to the Ichapur Khal on the north, and bounded on the east by the Grand Trunk Road. It consists of three circles. Firstly, Monirampur, situated in the bend of the river to the west of Barrackpore Cantonment, the spleen-rate of which is 24 per cent., while the ground water is low, there having been no water in a well 8 ft. 8 inches deep in February. The water-supply is mainly derived from the river. Secondly, Nawabgung, also placed on the bank of the river to the north of the last named, its spleen-rate being 28·6 per cent., while the water-level was 9 ft. below the surface of the ground in February, and had risen to 5 ft. from the ground in the rains of 1899. The water-supply is mainly derived from the river. Thirdly, Ichapur, which is situated to the north-east of the last circle, and the main portion of whose inhabitants reside at a distance of about one mile from the river, and near the Grand Trunk Road, and consequently are mainly dependant on tanks for their water-supply. The spleen-rate of this circle was 56 per cent., although as the ground water-level was 10 ft. from the surface in February and had not risen above 4 ft. in the rains of 1899 there was no difference in this respect from the other two circles which could possible account for the greatly higher spleen-rate of Ichapur, whose water-supply from tanks instead of from the river appears to be the only possible explanation of the facts recorded.

TABLE XI.

NORTH BARRACKPORE.

Area.	Ground Water-Level.		Water-supply.	Corrected Spleen percentages.		
	Feb., 1900.	Rains, 1899.		Adult Males.	Children.	General Total.
Monirampur (28)	Below 9 ft.	...	Mainly river.	24·5	23·5	24·0
Nawabgung (29)	9 ft.	5 ft.	do.	37·2	30·1	28·6
Ichapur (30)	10 ft.	4 ft.	Tank.	52·0	66·0	56·0

GARULIA.—This small Municipality is situated between the Hooghly river and the Grand Trunk Road immediately to the north of the Ichapur Khal, and its northern half has been supplied with filtered water from the Dunbar Cotton Mill for the past two years, but the inhabitants of the southern portion for the most part still drink river and tank water. As there was a very general opinion among the people living near the Mill that they had suffered much less from fever since the filtered water had been introduced, I determined to examine 100 persons who resided near the Mill, and the great majority of whom (about 80 per cent.) were found on inquiry to have been drinking the filtered water; and another 100 a little further to the south, but all within one mile of the former, and who stated that they drank river or tank water. Among the former class the spleen-rate was found to be 21·1 per cent., while among the river and tank water drinkers it was 46·5 per cent., although the latter included 28 men who had arrived from the North-West Provinces only in November last, that is after the fever season is nearly over, and whose spleen-rate was only 10·7 per cent. If these men are excluded from the calculation, the spleen-rate of the permanent residents of this southern portion of the

Municipality rises to 55·5 per cent., or just over two-and-a-half times as great as among the filtered water drinkers. A well in the northern part showed a water-level 9 ft. 6 inches below the surface of the ground in February, while it had risen to within 1 ft. 6 in. during the rains of 1899, so that there must have been a considerable degree of water-logging at that time, in spite of which the spleen-rate is low. These facts appear to admit of no other explanation than that the filtered water-supply was the cause of this low rate near the Mill as compared with a precisely similar area in other respects close by which had not the advantage of the stand-pipe water.

TABLE XII.

GARULIA.

Area.	Ground Water-Level. Feb., 1900.	Ground Water-Level. Rains, 1899.	Water-supply.	Corrected Spleen percentages. Adult Males.	Corrected Spleen percentages. Children.	Corrected Spleen percentages. General Total.
Northern part (31) (near Mill).	9 ft. 6 in.	1 ft. 9 in.	Filtered water.	17·7	24·6	21·1
Southern part (32)	...	...	River and tank water.	50·0	61·1	55·5

BHATPARA.—This Municipality consists of a narrow strip between the river Hooghly and the Eastern Bengal Railway and to the north of Garulia, and it is divided into three Wards, the northern two, Wards I. and II., of which, more particularly, and to a somewhat less extent the southern one, Ward III., obtain some filtered water from the Mills situated within this area. The spleen-rates of all are low, that of the southern one being slightly higher than the other two, although there is not much difference in their water levels, which are slightly in favour of Ward III. The figures are given in Table XIII. below.

TABLE XIII.

BHATPARA.

Ward.	Ground Water-Level. Feb., 1900.	Ground Water-Level. Rains, 1899.	Water-supply.	Corrected Spleen percentages. Adult Males.	Corrected Spleen percentages. Children.	Corrected Spleen percentages. General Total.
III. (33)	10 ft. 3 in.	4 ft. 4 in.	Mainly river.	19·9	27·8	23·6
II. (34)	9 ft. 8 in.	5 ft.	River and filtered.	22·0	12·0	17·0
I. (35)	7 ft.	2 ft. 6 in.	do.	27·1	11·5	19·3

NAIHATI.—This Municipality is situated between the Hooghly and the Eastern Bengal Railway extending from Naihati itself northwards for five miles as far as the Bhagar Khal, and although narrow to the south it gradually widens out to the north, so that while the lower three Wards are mainly inhabited near the banks of the river, the majority of the people in the two northern Wards live at some little distance from the river at Halishahar and Kanchrapara. Moreover, the Gauripur Jute Mills supply some filtered water to Ward-II., so it is worthy of note that this Ward again has the lowest spleen-rate, namely, 10·8, which is little more than half that of the Wards I. and III. on either side of it, which are dependant on the river for their supply. Further, Wards IV. and V. have the highest rates of all, being mainly dependant on tank water for their supplies, so that, and that in spite of their ground water-level being lower than that of Ward III.; so that the only way in which these variations can be explained is by the differences in the water-supplies of the various Wards, which are also in accordance with the results obtained in every previously considered instance.

TABLE XIV.

NAIHATI.

Ward.	Ground Water-Level.		Water-supply.	Corrected Spleen percentages.		
	Feb., 1900.	Rains, 1899.		Adult Males.	Children.	General Total.
I. (36)	...	...	Mainly River.	16·6	22·5	19·5
II. (37)	...	...	Partly filtered.	6·6	15·0	10·8
III. (38)	7 ft. 9 in	...	Mainly River.	7·1	31·0	19·0
	16 ft. 6 in.	8 ft.				
IV. (39)	10 ft. 3 in.	4 ft.	Mainly Tank.	15·3	29·4	22·3
V. (40)	10 ft. 3 in.	4 ft.	Tank.	13·3	42·5	27·9

BARASET.—This Municipality is situated on the Soonthee Nudi some eight miles east of the Hooghly river, and its surface drainage flows away to the south-east into the Kocho Bhil. The Soonthee was formerly a large river, but now it resembles an elongated swamp with little or no current except during the rainy season, while its bed is encroached upon in numerous places by series of tanks which in places leave but a few yards between them for the stream, and fishing weirs, etc., also obstruct its course The Municipality is divided into five Wards, Nos. I. and II. including the town, while Nos. IV. and V. are to the east on the Soonthee Khal, and No. III. to the south. In all the spleen-rates are high, and the ground water-levels do not vary much, but are high in the rains, showing obstructed drainage and water-logging. The water-supply is from tanks, although one or two tube wells have been put down

TABLE XV.

BARASET.

Ward.	Ground Water-Level.		Water-supply.	Corrected Spleen percentages.		
	Feb., 1900.	Rains, 1899.		Adult Males.	Children.	General Total.
I. & III. (41)	12 ft. 4 in.		Tank only	52·3	50·4	51·5
III. (42)	16 ft. 3 in.	4 ft.	do.	38·1	80·3	59·2
IV. (43)	8 ft. 2 in.	0 ft. 3 in.	do.	44·2	70·8	57·5
V. (44)	12 ft. 4 in.	4 ft.	do.	38·6	51·2	44·9

WATER-LOGGING AND THE RAILWAY.—It have already been pointed out in discussing the Ward variations of the spleen-rate that there is no definite relationship between the amount of malaria and the ground water-levels. Thus Maniktolla and Chitpore-Cossipore are the most water-logged parts of the whole area, yet they have the lowest spleen-rates on account of their filtered water-supply. The fact that the bank of the Hooghly river is slightly higher than the country further to the east, so that the surface water flows away from the river, and eventually finds its way back through khals to the river or runs off to the south into the Great Salt Water Lakes, might at first sight seem to indicate that the ground water-level would be lower near the river than it is further to the east. Measurements in the wells, however, do not bear this out, for there is very little difference in this respect in the water-level measured in wells on either side of the railway, while the differences noted were rather more frequently in favour of the eastern portions than the contrary. The differences in the spleen-rate, then, of the eastern and western parts cannot be explained on any theory of water-logging, while an examination of the whole area Ward by Ward shows no definite relationship between the spleen-rates and the height of the ground water-level, as a study of the Tables and Map will show.

The Eastern Bengal Railway, which runs from north to south through this area, and, together with the Grand Trunk Road, roughly divides it into western and eastern portions, has frequently been held responsible for the unhealthiness of the country, for it lies across the line of surface drainage. As, however, the drainage flows to the east if it were materially obstructed the western part should be the more unhealthy, instead of which precisely the opposite holds good. Moreover, in the few places in which wells were found on either side of the railway, although at some distance from it, there was no constant or marked difference between either the level of the ground-water in the dry season, or the height to which it rose during the rains on either side of the road and railway. There is, then, no evidence that the health of this tract has been influenced by the railway or the Grand Trunk Road, and the spleen variations cannot possibly be attributed to their action.

DISTRIBUTION OF THE *Anopheles* MOSQUITOS.

It must now be taken as proved that malaria can be communicated to man by the bites of the *Anopheles* genus of mosquitos, which have previously bitten another case of malaria, and in whose body the plasmodium has undergone developemental changes. It still, however, remains to be proved that this is the only or even the most common way in which the disease is obtained, and it is worthy of note that Laveran, who was the first modern exponent of the mosquito theory, is still of the opinion that it will not explain all that is known of the etiology of the disease. Still enough is known to make it highly advisable to consider the question of the possibility of destroying the particular breed of mosquito which plays a part in distributing malaria. This should not be impossible in limited areas, at any rate, if Major Ross's statement as to their breeding-grounds is correct, namely, that they mainly breed in small pools which are not inhabited by fish, and yet are not so small that they will dry up in a few days, and consequently that such suitable pools are few and far between. In order to test this statement I searched for the larvæ in several Municipalities, but regret to say that I have not been able to confirm Ross's statements. On the contrary, I found the *Anopheles* larvæ in numerous tanks as well as in the small pools which Ross describes, and that too in spite of the former as well as some of the latter abounding in fish. This having been ascertained, a small portion of Maniktolla, measuring about one-sixteenth of a square mile, and containing some thirty tanks, was further examined. During the dry months of from February to May, which are the minimum fever months of the year, I found the *Anopheles* larvæ in from one-third to two-thirds of these tanks, often in enormous numbers, one of them for example, having been estimated to have contained several million larvæ on one day on which it was examined in May. In the earlier months especially they were also found in several small pools, but the numbers there were nothing as compared to those in the tanks, which are certainly the common breeding-ground of the *Anopheles* in the dry season at any rate. Three pools in a low-lying area are of interest, for in one, some two yards square, and a second which was five yards in diameter, fairly numerous *Anopheles* larvæ were found in spite of the presence of small fish in both, so that it is not surprising that they can also survive in tanks which are swarming with fish. Further, I failed to find any cases of fever near the infected tanks in the hot weather. As there must be several hundred tanks in the five square miles of Maniktolla alone, the chances of being able to destroy these larvæ appears to be very remote. Further observations are being made on the seasonal distribution of these larvæ and the amount of fever, but it may be mentioned that they nearly disappeared from the tanks after the first burst of the rains, and remained absent during a break which followed, although fever now began to be prevalent, so that up to the present the number of the *Anopheles* has been in inverse proportion to the amount of fever. Possibly the tank forms are different from those of the rainy season in the small pools, but I have not yet been able to settle this point. The differences will be only microscopical, so that this would not lessen the practical difficulties in lessening malaria in Bengal by destroying the mosquitos, the only possible way of partially affecting which would appear to lie in the time-honoured method of extensive drainage in order to lessen the number of suitable breeding-grounds for the mosquitos.

The great difficulty of destroying the *Anopheles* larvæ in Bengal enhances the importance of the influence of a filtered water-supply in reducing so materially the amount of fever, which has been shown to be the case in portions of this tract of country, while the much greater liability of the drinkers of tank water to malaria suggests that the disease may commonly be obtained by drinking infected water, as has for centuries been considered to be the case. Such a mode of infection may be easily reconciled with the mosquito theory if we allow that these insects, in addition to directly inoculating the disease, may also take the parasite back to water, perhaps by means of the black spores described by Ross, in which they may survive for a limited time only, so that the infection has frequently to be renewed by the mosquitos. This is a point which can only be settled by investigation, which I hope shortly to be able to undertake.

Lastly, an examination of charts showing the monthly rainfall and fever-rate in this tract of country revealed the fact there is no constant relationship between either the amount or monthly distribution of the rainfall of different years and the amount of malarial fever. A more detailed examination, however, showed that there is a relationship between the daily distribution of the rain and the fever; those years in which the rainfall is very irregularly distributed with frequent and prolonged breaks, being those in which malarial fevers are most prevalent. This point is also being more closely studied, in conjunction with the observations on the variations in the distribution of the *Anopheles*.

CONCLUSIONS.

The general result of the inquiry has been to show that there is a marked difference between the health of the riverine and more inland portions of the area examined, the former being much more healthy than the latter. The comparatively healthy area extends from the river to the Grand Trunk Road, and in some parts to the Railway, a distance varying from one to two miles. No marked or constant differences in the ground water-level of the healthy and unhealthy parts has been found, which could possibly account for the differences in the spleen-rate noted, so that no theory of water-logging will explain them.

The most striking exception to the rule that the areas at a distance from the river bank have a high spleen-rate is that of Maniktolla, and the eastern portions of Chitpore-Cossipore between the Grand Trunk Road and the railway, both of which, together with the rest of the latter Municipality, have the lowest spleen-rates of all. Moreover they are also the most water-logged portions of the whole area, their ground water-levels both in the dry and in the rainy seasons being the highest met with, so that there must be some other factor to account for their marked immunity from malaria. This is certainly not the absence of the malaria-bearing mosquito, for it was in the first-named place that they were found to be more wide-spread during the minimum fever season than has hitherto been reported from any part of India. The only possible factor remaining is the water-supply, and it is noteworthy that these two water-logged Municipalities are the only ones which have a full filtered water-supply from the same source as Calcutta itself. That this good water-supply is the true explanation of their relative immunity from malaria is borne out by the very low spleen-rate of certain Wards of other Municipalities which have a partial filtered water-supply from various Mills, together with the low rates of the Wards of Baranagar and South Dum Dum, which border on Chitpore-Cossipore, from whose stand-pipes some of their inhabitants were obtaining filtered water, the details of which have already been given. Finally, the figures given in Table X. shows the spleen-rates among river water drinkers to be nearly double, and that of tank water drinkers to be nearly treble that of filtered water drinkers, strongly corroborate the evidence as to the benefit to be derived from filtered water, and affords a key to the whole distribution of the varrying spleen-rates, as can be seen from a study of the accompanying map. Thus, Chitpore-Cossipore West, which has the double advantage of a filtered water-supply and close proximity to the river, so that those who do not drink filtered water will for the most part take river water, has the lowest rate of all, namely, 7·4. The eastern part of the same Municipality, which has tank instead of river water as an alternative to the filtered supply, on the other hand, has a spleen-rate of 14·8, which is almost the same figure as that of Maniktolla, with a similar water-supply. Further, those Wards which are situated immediately on the river bank, but do not possess a filtered water-supply, and consequently get their supply mainly from the river, and to a less extent from tanks, have a rate intermediate between those with filtered water and the inland ones which are dependant entirely on tank water. In short, all the Ward variations in the spleen-rate of the whole area can be explained on the ground of their varying water-supplies in a manner which no other explanation will approach in completeness, so that it is impossible to come to any other conclusion than that the above is the true explanation of the facts recorded. Whether the *Anopheles* mosquitos play a part by taking the malarial parasite back to the tanks from their human hosts or not must be left to be determined by future experiments, but that a good water-supply is an important prophylactic measure in the lessening the prevalence of malaria must I think be admitted, and can be safely acted on.

XVIII.—*I. Further Researches on Mercurous Nitrite and its Derivatives. II. On Mercurous Iodide and a new Method of its Preparation.—By*

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  (4) Interaction of Mercurous and Mercuric Nitrites with the Nitrites of Silver and Sodium respectively.
II. Mercurous Iodide: a new Method of its Preparation.

(1)

Preparation of Mercurous Nitrite on a large scale.

As the investigations I am about to describe involve the use of comparatively large quantities of mercurous nitrite at a time I shall begin with describing a method of preparing the salt, which has been found to be more economical and far less troublesome than the usual method.

A tall beaker is taken containing nitric acid (sp. gr. 1041) diluted in the proportion of 1 : 4 with water; mercury is now poured in, care being taken not to fully cover the bottom but to leave an annular or horse-shoe-shaped space. The crystals which are formed on the convex surface of the mercury are continually pushed aside into the empty space by the evolution of gases during the initial stages of the reaction. On standing overnight, however, a crust of the nitrite is formed on the surface of the metal, which acts as a protective layer, thereby hindering further action.

All that is now necessary to do is to incline the beaker gently, when the deposit of the salt slips off into the empty space as explained before, leaving a fresh surface of mercury exposed. This may be repeated 4 or 5 times in the course of the day. Instead of inclining the beaker, the layer of crystals may be carefully scraped off the surface with a glass rod. The process may be allowed to go on for a week, resulting in the continuous growth and accumulation of the salt; the reaction may be started simultaneously in about half a dozen beakers arranged in a row, so as to secure a copious supply.

In the previous papers* it was recommended that each time a layer of crystals is formed, the mother liquor together with the mercury should be decanted off into another beaker. This is a wasteful method, for as soon as the super-incumbent liquid is removed, torrents of red fumes appear on the surface of the mercury. These red fumes are caused by the combination of nitric oxide with the oxygen of the air. It is the nitric oxide that evidently gives rise to the formation of th nitrite, and its loss has to be guarded against.

(2)

PREPARATION OF CHEMICALLY PURE MERCUROUS NITRITE.

The mercurous nitrite prepared as above will answer well enough for ordinary purposes. It generally contains, however, impurities, chiefly in two shapes. First, the crystalline mass encloses minute globules of mercury which cannot be entirely detached. Secondly, as the salt has to be dried on the porous tile, a portion of the heavy mother liquor consisting of mercurous *nitrate* dries up along with it. When it is desirable to obtain the salt in a state of absolute purity, it is mixed with a sufficiently large quantity of water and heated to boiling point for some time. Treated in this way about 18 p.c. of the nitrite undergoes dissociation as already pointed out; thus:

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* For literature on the subject, see Journal, Asiatic Society, 1896, Pt. ii, p. 1, and Transactions, Chem. Soc. for 1897, p. 338.

$$Hg_2(NO_2)_2 = Hg + Hg(NO_2)_2.$$

While by far the larger proportion of it dissolves *as such;* the saturated solution while still hot is rapidly passed through a "ribbed" filter paper, and the filtrate briskly stirred with a rod. In this way a fine, mealy, crystalline deposit is obtained, which is dried on a porous tile and preserved *inside a dessicator.* The presence of even a trace of atmospheric moisture brings about slow decomposition evolving nitrous fumes. As a test case it may be mentioned that 0·54 g. of the pure salt was placed on the scale pan for three hours, and it lost 5 mgs. during that time.

(3)

INTERACTION OF MERCUROUS NITRITE AND ETHYL IODIDE.

Preliminary.

About four years ago while describing mercurous nitrite and its general properties, which were found to bear a remarkable analogy to those of silver nitrite, the author expressed a hope that this new compound would yield nitro ethane by interaction with ethyl iodide.

Since then it has been qualitatively shown that the reaction gives simultaneously both nitro ethane and its isomer, ethyl nitrite.* The present investigation embodies a fuller and more systematic study of this reaction.

Experimental.

The general method first described by V. Meyer and O. Stüber has been in the main followed.† I shall therefore confine myself to such details only as have a direct bearing on the subject in hand.

Exp. I. 120 g. of mercurous nitrite and 69 g. of ethyl iodide were digested together over a water bath in a round-bottomed flask to which was attached a tubulated funnel and a reflex condenser. The digestion was continued so long as ethyl nitrite was evolved. It is necessary to note here that as soon as ethyl iodide is poured on silver nitrite, an energetic action at once sets in, but when mercurous nitrite is added to the alkyl iodide there is scarcely any perceptible evolution of heat, and the reaction only begins after digestion has proceeded for some time. The open end of the condenser was connected with two tall cylinders (See Fig.)

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* Proc. Chem. Soc. 1896, p. 218.

† Ber. Deut. Chem. Ges., V, pp. 399, 514.

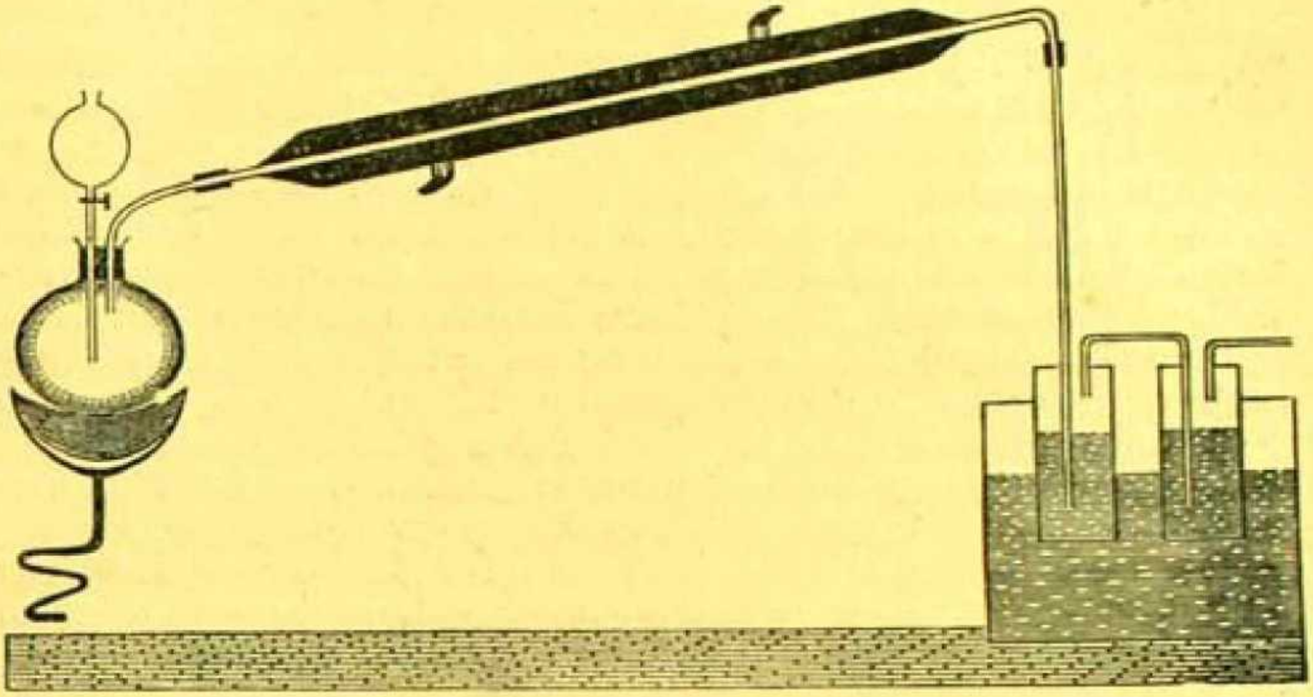

Fig. shewing the formation of Ethyl Nitrite and its absorption by Alcohol.

containing a measured volume of alcohol for the absorption of ethyl nitrite. These cylinders were again kept immersed in ice-cooled water of an average temperature of 10° C., that of the Laboratory varying from 23° to 25° C. In this manner a concentrated solution of what is called in the Pharmacopœia *Spiritus Ætheris Nitrosi*, was obtained, the strength of which was determined by Allen's method.* The yield of ethyl nitrite was found to be 5·1 g.

Exp. II. 94 g. of mercurous nitrite and 35 gms. of ethyl iodide were digested as above. The yield of ethyl nitrite was 3·1 g.

Exp. III. In this case 138 g. of mercurous nitrite were digested with 54 g. of ethyl iodide, yielding 5·2 g. of ethyl nitrite.

It will thus be seen that the yield of ethyl nitrite is only a fraction of what is demanded by theory. This is partly due to the reaction being completed only during subsequent digestion on the oil bath, but chiefly to the fact that when once a certain amount of mercurous iodide has been superficially formed, a large proportion of the nitrite aggregates into hard lumps into which the ethyl iodide can only slowly and with difficulty penetrate.

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* Pharmaceutical Journal, 3rd Series, Vol. XV, p. 673.

This is also the case with silver nitrite, though not in so marked a degree.*

Exp. IV. This was a control experiment in which silver nitrite was digested with ethyl iodide: 90 g. of the silver salt were treated with 88 g. of the alkyl haloid. The yield of ethyl nitrite was 4·2 g.

NITRO ETHANE.

After the evolution of ethyl nitrite had ceased, the contents of the flask were subjected to distillation, first over a water bath, and afterwards over an oil bath. The distillates were caught separately.

It was invariably found that during distillation over an oil bath, the receiver was filled with nitrous fumes, a part of which was absorbed by the distillate, imparting to it a bluish tinge. As there was not the slightest trace of yellow colour either in the flask or in the condenser itself, it was suspected that *nitric oxide* was evolved by the slow and gradual decomposition of a portion of mercurous nitrite, which combined with the oxygen of the air in the receiver. The suspicion was confirmed. The presence of the nitrous fumes is highly objectionable, as the crude nitro ethane so obstinately holds them in solution that they cannot be got rid of during fractionation. Distillation in a slow current of carbon dioxide was therefore resorted to for excluding air. In the control experiment with silver nitrite (See *ante*, Exp. IV.) nitrous fumes, though in a far lesser degree, were also noticed in the receiver.†

After the distillation was over, the compact mass of mercurous iodide and nitrite were removed from the flask, well powdered in a mortar, and once more treated with the fraction below 100°, when a further quantity of crude nitro ethane was obtained.

A fair idea of the yield of nitro ethane may be had from the details of one among several experiments. 190 g. of mercurous nitrite and 95 g. of ethyl iodide yielded a distillate of 7 g. between 100°–108°, of 3¼ g. between 108°–110°, and of 4 g. between 111°–114°.

The fraction which came off between 113°·5–114° (uncorrected) was practically pure nitro ethane. It was treated with an alcoholic solution of caustic soda as recommended by Nef. (Annalen: 280, p. 267). The precipitate of sodium nitro-ethane was washed with absolute alcohol. In this manner 2·5 g. of nitro-ethane yielded 2·1 g. of the sodium compound.

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* "Es gelang uns unter keinen Umständen das ganze Jodäthyl in die Reaction zu verwickeln, sondern stets war das bei der Rectification zuerst übergehende Produkt stark jodhältig. Wir haben auf jede weise versucht, das Jodäthyl voll ständig auszubeuten, doch immer vergeblich." (*Loc. cit.*, p. 402.)

† The behaviour of Mercurous Nitrite in this respect also resembles that of Silver Nitrite. *Cf.* Divers and Schimidzu "Action of heat upon Silver Nitrite, air being excluded"—(Trans. Chem. Soc. Journ., 47, 634), where it is shown that nitric oxide is one of the products of decomposition.

It responded to all the characteristic reactions: its aqueous solution turned blood-red with ferric chloride and green with copper sulphate. A concentrated solution of it gave with corrosive sublimate solution a white, mealy, crystalline precipitate. The sodium salt which is extremely hygroscopic exploded with a loud detonation when heated in a narrow test tube. An estimation of sodium is given below.

0·2416 g. gave 0·1795 g. of $Na_2 So_4$.

	Calc. for $Na C_2 H_4 NO_2$	Found.
Na	23, 60	24·06.

From the above investigations it would appear that by the action of mercurous nitrite on ethyl iodide about equal quantities of nitro ethane and its isomer ethyl nitrite are formed. The yield is, however, somewhat poorer than with silver nitrite, owing to the formation of very compact, hard lumps of mercurous iodide, which interferes with the reaction being completed.

(4)

INTERACTION OF MERCUROUS AND MERCURIC NITRITES WITH THE NITRITES OF SILVER AND SODIUM.

1.

Mercuric Nitrite and Sodium Nitrite.

To the neutral solution of mercurous and mercuric nitrites (the products of dissociation of mercurous nitrite: Journ. Chem. Soc. Trans. 1897, p. 340) is added sodium chloride to remove mercurous mercury. The filtrate which now contains mercuric nitrite and a small quantity of sodium chloride if it was added in excess, as well as *sodium nitrite*, is allowed to evaporate spontaneously. In course of time an orange, crystalline deposit is formed, and this is followed by the appearance of shining iodine-like dark scales; and last of all we obtain a yield of rhombohedral crystals of *sodium nitrate.* Sometimes the orange-red and black compounds are not obtained, but instead we get only sodium nitrate, sometimes again the three compounds are obtained in regular succession, though one kind may predominate over the others.

During the last three years I have repeated the experiments several times, but I have not been able so to control them as to ensure the formation of one variety only to the exclusion of the others.

If there be no sodium chloride present in the mercuric solution, the red and black deposits are not formed, for, as will be seen below, they are oxychlorides of mercury and the presence of sodium chloride is a *sine quâ non* for their formation, and the only yield is one of sodium nitrate. But this last compound has sometimes been observed as the sole product without the formation of the former, even in presence of an excess of sodium chloride. The reaction goes on very slowly, and it takes a month and upwards to complete it.

Analysis and general properties of the red and iodine-like lustrous scales:—

(1) 0·3505 g. gave 0·3485 HgS.
(2) 0· 465 ,, ,, 0· 455 ,,
(3) 0·5086 ,, ,, 0·2034 AgCl.
(4) 0·6166 ,, ,, 21·1 c.c. moist O at 31° C. and 752 mm. pressure.

	Theory for	Theory for	Found	
	$HgCl_2 . 2 HgO$	$HgCl_2 . 2 HgO . \frac{1}{2} H_2O$	i	ii
Hg	85·35	84·27	84·45	84·34
Cl	10·10	9·97	9·90	
O	4·55	4·50	4·17	
H_2O		1·26		
	100·00	100·00		

The analyses recorded above are of distinct preparations, and they conform to the formula $HgCl_2 . 2 HgO . \frac{1}{2} H_2O$.

These salts do not lose in weight when kept in a dessicator over strong sulphuric acid or placed in a steam chamber at 100° C. When heated in a bulb-tube a deposit of moisture is invariably noticed, and a sublimate of mercurous and mercuric chloride obtained, with a residue of orange-yellow oxide. Treated with caustic soda solution, the dark variety changes to orange-yellow.

Millon, and more recently Thummel (Archiv. Pharm.§ [3], 27, 589–605) have exhaustively studied the oxychlorides of mercury, and have described several of them. These were obtained, however, by adding together solutions of mercuric chloride and hydrogen potassium carbonate under varying conditions. Volhard got shining dark crystals by the action of sodium acetate upon corrosive sublimate solution (Annalen: 255, p. 252); whilst Haack obtained a reddish-brown crystalline deposit by treating mercuric chloride with phosphate of sodium (*ibid.* 262, 189), all of the formula $HgCl_2 . 2 HgO$. The red and black shining compounds, the subject of the present paper, agree in general properties with those obtained by the above chemists; but the *hydrated* modifications I do not find mentioned anywhere.

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§ The Original Memoir is not available here. I am quoting from Watt's Dict. of Chem., New Ed. See also Abs. Chem. Soc. Journ., Vol. LVI, 1050.

I.

Mercurous Nitrite and Silver Nitrite.

A. Concentrated solutions of mercurous nitrite and silver nitrite.

As both mercurous nitrite and silver nitrite are very sparingly soluble in cold water, the solutions used were always kept at about 100° C.

Method of experiment:—To the hot or boiling solution of mercurous nitrite containing necessarily mercuric nitrite was added the solution of silver nitrite. No effervescence due to the evolution of gases was noticed, and the liquid which at once became cloudy on account of the separation of metallic mercury, was allowed to stand over night. Next day a perfectly clear solution was obtained, with a deposit of mercury and silver in successive layers at the bottom of the vessel,—the lower one of dirty grey mercury, and the upper one of an arborescent and filamentous growth of shining minute crystals of silver. These metals were estimated in the usual way. The strength of the filtrate was determined by finding out the weights of the *ous* and *ic* mercury as well as that of silver in solution. Control analyses were also simultaneously made to ascertain the original strengths of the mercury and silver nitrite solutions under exactly similar conditions of temperature. For details see Table of Analyses.

In order to estimate the total amount of nitrogen and the transformation, if any, of the nitrite into nitrate, or any other compound of nitrogen, the following method of analysis as exemplified in Exp. I was adopted.

50 c.c. of mercurous and mercuric nitrite solution were boiled for a few minutes with an excess of caustic soda; 25 c.c. of silver nitrite solution were also similarly treated. The filtrates from the mercury and silver precipitates, containing nitrogen in the shape of nitrite of sodium, were now added together and made up to a given volume. After the interaction of mercurous and silver nitrite solution, an aliquot portion of it was boiled with the alkali, and the filtrate set aside as above. The nitrogen in both the cases was estimated by the Crum-Frankland process, as also by the *Urea* method as worked out by Percy Frankland. As a further check a few c.c.'s were in certain instances evaporated to dryness in a porcelain boat and the nitrogen determined by Dumas' method. It is remarkable that the sum total of nitrogen as found by all these different methods was exactly the same, proving that *not only was there no loss of nitrogen during the reaction but that it remained all*

along in the shape of the nitrites of the respective metals, in other words, there was no change in the radical NO_2.

B. Dilute solutions of silver and mercurous nitrite, (*vide* Exp. 5 and 6 in the Table of Results of Analyses).

It is worthy of note that under such conditions of dilution no silver was precipitated.

C. Mercurous Nitrite and Sodium Nitrite.

In this case also the total amount of nitrogen remained constant, and in the shape of nitrites, the only difference being that the mercurous nitrite was completely transformed into mercuric nitrite with precipitation of mercury. In Exp. 7 a $6^{\circ}/_{\circ}$ solution of sodium nitrite was used. Sodium nitrite was, however, found to have scarcely any action on very dilute solutions of mercurous nitrite.

DISCUSSION OF RESULTS.

It is not easy to enter into the mechanism of the reaction of mercurous and silver nitrites, when it is remembered that there is no change in the radical NO_2. Mercurous nitrite, it is true, has already been shown to undergo partial dissociation according to the equation,

$$Hg_2\ (NO_2)_2 = Hg\ (NO_2)_2 + Hg.$$

when in solution; but the reaction, we are at present studying, can scarcely be brought under the same category. At the same time, it must be admitted that, if we were to regard for a moment a molecule of silver nitrite playing the role of a molecule of mercurous nitrite, all the equations under A. could be established on a common basis.

For instance in Exp. 1, $3\ Hg\ NO_2 + Ag\ NO_2$ may be regarded as equivalent to $4\ Hg\ NO_2$, *i.e.*, $2\ Hg_2\ (NO_2)_2$ which may be expected to dissociate as follows :—

$2\ Hg_2\ (NO_2)_2 = 2\ Hg\ (NO_2)_2 + 2\ Hg$ [or $Hg + Ag$]. In Exp. 3, $7\ Hg\ NO_2 + 3\ Ag\ NO_2$ would similarly be equivalent to $10\ Hg\ NO_2$ *i.e.*, $5\ Hg_2\ (NO_2)_2$ which would dissociate thus : $5\ Hg_2\ (NO_2)_2 = 5\ Hg\ (NO_2)_2 + 5\ Hg$ [or $2\ Hg + 3\ Ag$], with this difference, that in place of 2 Hg we get $Hg + Ag$, and in that of 5 Hg we get $2\ Hg + 3Ag$. In Exp. 5 and 6 bracketted together under B., where dilute solutions of both the nitrites were used, and where there was no precipitate of metallic silver, the nitrite of silver apparently seems to take no part. The same remarks would also apply to Exp. 7 and 8 (*vide* Table of Analyses), where sodium nitrite also appear to act *catalytically*, an expression conveniently used to cover ignorance. The true explanation of the reaction has yet to be found out, and with this view, it is intended to take up another series of experiments under various degrees of dilution of the nitrites.

Table of Results of Analyses.

No of Exp.		C. C. of Mercury Sol. used.	Wt. of *ous* Mercury in Sol. in grams.	Wt. of, *ic*, Mercury in Sol.	C. C. of AgNo₂ Sol. used.	Wt. of Ag in Sol.	Wt. of *ous* Mercury after addition of AgNo₂ Sol.	Wt. of, *ic*, Mercury in ditto.	Wt. of "free," *i.e.*, pptd. Mercury.	Wt. of "free" Silver.	Reaction as Expressed in Formula.
A	(1)	50	1·074	0·863	25	0·304	0·564	1·205	0·168	0·104	$6 Hg'NO_2 + 5 Hg''(NO_2)_2 + 3 Ag NO_2 = 3 Hg'NO_2 + 7 Hg''(NO_2)_2 + 2 AgNO_2 + Hg + Ag.$ or $3 Hg NO_2 + Ag NO_2 = 2 Hg(NO_2)_2 + Hg + Ag.$
	(2)	50	0·685	0·676	25	0·233	0·257	0·973	0·130	0·117	$5 Hg'NO_2 + 5 Hg''(NO_2)_2 + 2 Ag NO_2 = 2 Hg'NO_2 + 7 Hg''(NO_2)_2 + Ag NO_2 + Hg + Ag.$ or $3 Hg NO_2 + AgNO_2 = 2 Hg (NO_2)_2 + Hg + Ag.$
	(3)	25	0·173	0·188	20	0·063	0·053	0·274	0·034	0·027	$10 Hg'NO_2 + 11 Hg''(NO_2)_2 + 7 Ag NO_2 = 3 Hg'NO_2 + 16 Hg''(NO_2)_2 + 4 Ag NO_2 + 2 Hg + 3 Ag.$ or $7 HgNO_2 + 3 AgNO_2 = 5 Hg (NO_2)_2 + 2 Hg + 3 Ag$
	(4)	100	0·564	0·569	50	0·0523	0·488	0·614	0·031	0·0105	$18 Hg'NO_2 + 18 Hg''(NO_2)_2 + 5 AgNO_2 = 15 Hg'NO_2 + 20 Hg''(NO_2)_2 + 4 AgNO_2 + Hg + Ag.$ or $3 Hg NO_2 + Ag NO_2 = 2 Hg(NO_2)_2 2 + Hg + Ag.$
B	(5)	100	0·3454	0·382	50	0·076	0·2284	0·4464	0·057	...	$6 Hg'NO_2 + 7 Hg''(NO_2)_2 + AgNO_2 = 4 Hg'NO_2 + 8 Hg''(NO_2)_2 + AgNO_2 + Hg.$ or $2 HgNO_2$ *i.e.*, $Hg_2(NO_2)_2 = Hg(NO_2)_2 + Hg.$
	(6)	100	0·392	0·486	50	0·042	0·345	0·507	0·026	...	$15 Hg'NO_2 + 19 Hg''(NO_2)_2 + Ag NO_2 = 13 Hg'NO_2 + 20 Hg''(NO_2)_2 + AgNO_2 + Hg.$ or $2 HgNO_2$, *i.e.*, $Hg_2 (NO_2)_2 = Hg (NO_2)_2 + Hg.$
C	(7)	25	0·172	0·242	Na No₂ in c c. 20	Wt. of NaNo₂ in Sol. 1·20	...	0·333	0·081	...	$2 Hg'NO_2 + 3 Hg''(NO_2)_2 + Na NO_2 = $ ——— $4 Hg''(NO_2)_2 + NaNO_2 + Hg.$ or $2 Hg NO_2$, *i.e.*, $Hg_2 (NO_2)_2 = Hg(NO_2)_2 + Hg.$
	(8)	25	0·700	0·620	20	...	...	0·980	0·34	...	$2 Hg'NO_2 + 2 Hg''(NO_2)_2 + Na NO_2 = $ ——— $3 Hg''(NO_2)_2 + Na NO_2 + Hg.$ or $2 HgNO_2$ *i.e.*, $Hg_2 (NO_2)_2 = Hg(NO_2)_2 + Hg.$

Chemical Laboratory, *Presidency College.*

ON MERCUROUS IODIDE—*A new Method of its Preparation.*

The yellow residue in the flask (see previous paper) consisting presumably of a mixture of mercurous iodide and the unacted-upon mercurous nitrite was well powdered and introduced into a combustion tube, plugged with asbestos and heated in a tube-heater (Röhren-Oefen.). The powder occupied nearly one-third the length of the tube. When the temperature rose to about 135° C, nitrous fumes began to be disengaged, and an oily liquid collected at the mouth of the tube. This liquid is nitro-ethane, a portion of which obstinately remains absorbed in the hard mass of the mixture referred to above.

On heating more than two hours from 155° to 163°, for the most part stationary at the latter temperature, a thin deposit of lustrous lemon-yellow scales was obtained. The yield however was very poor. Next day the heat was raised to 192°, and the temperature maintained nearly constant for three hours: a sublimate of a compact mass of yellow and orange-yellow crystals was the result.

In another experiment the sublimation was carried on between 190°–210° C. stationary for the most part at 210°, in this case orange-yellow crystals were obtained. In several experiments, however, conducted within the above range of temperatures, the sublimate which was deposited nearest the source of heat was of a dark brown tint; next to it was a deposit of orange-yellow and yellow tablets respectively; and, last of all, near the mouth of the tube was a ring of scarlet crystals of *mercuric* iodide. Sometimes it so happened that by far the larger proportion of the sublimate was of scarlet mercuric iodide; but whether this was due to the decomposition or dissociation of mercurous iodide formed at first ($Hg_2I_2 = HgI_2 + Hg$) or not is not clear. More than a dozen experiments were carried on, and the experiences accruing therefrom are recorded above.

General properties:—In Yvon's[*] experiment in which Mercurous Iodide was prepared by the direct union of the elements, only the yellow and orange-yellow crystals are described. According to this chemist sublimation begins at 190° C. My own experience confirms his in the main, though I have noticed that a small quantity of mercurous iodide almost always sublimes between 163° and 170° C.

The dark brown variety when powdered and kept in contact with dilute nitric acid turns dirty yellow, and the orange-yellow under similar conditions orange-red, without undergoing change in the composition; but boiled for some time with the dilute acid, both these varieties are gradually transformed into *mercuric* iodide, and from the hot mother liquor also bright scarlet spangles of mercuric iodide crystallize out on cooling.

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[*] Compt. Rend. 76, p. 1607.

Result of Analysis:—Estimation of iodine. The methods described in the standard works of Fresenius, Crookes, &c., for the estimation of iodine in mercurous iodide appeared to be tedious and troublesome in view of the numerous determinations involved. Reduction was effected with zinc and sulphuric acid under certain modifications. The compound is finely powdered and transferred to a flask. Pure granulated zinc and dilute sulphuric acid are then added together with a few pieces of scrap platinum, when evolution of hydrogen at once sets up; the flask is kept actively rotated. After a few minutes the zinc becomes amalgamated and further action ceases. A drop of platinic chloride is now added, reduction proceeds, and a pink colour pervades the liquid, and the flask is shaken as before. When the reduction is complete the solution should be perfectly clear and colourless, and there should not be any trace of a powdery black residue at the bottom of the flask. The iodine is estimated in the usual way, and the additional halogen introduced with the standard Pt.Cl$_4$ drop, corresponding in the present instances to 0·005 AgCl, allowed for. Sometimes the zinc is treated beforehand with the dilute acid and a few drops of PtCl$_4$, and the *platinized* zinc, washed free from chlorine, is added in successive instalments to bring about reduction, which is finished in 20 min. to half an hour.

As control experiments, iodine in resublimed mercuric iodide was estimated according to the above method. Thus:

(1) 0·2232 g. gave 0·2324 AgI
(2) 0·0604 „ „ 0·0625 „

	Calc. for HgI$_2$	Found I	Found II
I:	55·95	56·27	56·00

Result of analyses of the dark brown, orange-yellow and yellow modifications of mercurous iodide.

(1) 0·4282 g. gave 0·3043 AgI whence I = 38·40
(2) 0·2204 „ „ 0·1577 „ „ „ = 38·67
(3) 0·2558 „ „ 0·1834 „ „ „ = 38·74
(4) 0·2038 „ „ 0·1446 „ „ „ = 38·34
(5) 0·0824 „ „ 0·0587 „ „ „ = 38·47

Theory for HgI requires I = 38·84 °/$_{o}$, the Mercury amounted to 61·24 °/$_{o}$, that demanded by theory being 61·16 °/$_{o}$.

It will much facilitate operation if between 0·2 to 0·15 g. be taken for purposes of analyses. In the case of the dark brown variety of the haloid it is advisable to examine it carefully with a magnifying glass as inside its thick crust minute globules of mercury are often found enclosed.

From the foregoing inquiry it is evident that when the residue in the flask after the interaction of mercurous nitrite and ethyl iodide is heated in a tube between 190°–210°, mercurous iodide sublimes off. The compact mass of crystalline tablets thus obtained varies in all gradations of tint from lemon-yellow and orange-yellow to orange-brown and even dark brown.

Chemical Laboratory, Presidency College.

XIX.—*Description of a new Himalayan genus of* Orobanchaceæ.—*By* J. S. Gamble, M.A., F.R.S., and D. Prain.

[Received 7th August; Read 5th October, 1900.]

GLEADOVIA Gamble & Prain.

Calyx tubulosus, parum inflatus limbo æqualiter 5-lobo. *Corollæ* tubus parum incurvus, labium posticum incurvo-erectum concavum minopere emarginatum, anticum brevius suberectum lobis 3 subæqualibus erectis. *Stamina* inclusa filamentis apice in connectivum conicum dilatatis, antherarum loculi æquales adnati basi divergentes et mucronato-aristati. *Ovarii* placentæ 4, per paria approximatæ, medioque confluentes; stigma dilatatum late æqualiter 2-lobum.—*Herba* parasitica carnosa rhizomate incrassato, squamis ovatis suffulta. *Flores* densius paniculati, pedicellati, 2-bracteolati. *Color* pallide purpurea.—Species singula, Himalaica.

The interesting plant for which we propose the above generic description was discovered in Jaunsar in 1898 by the officers of the Imperial Forest School, Dehra Dun; we dedicate it to Mr. F. Gleadow, who was the first actually to find it.

Our plant has all the facies of a *Christisonia*, but cannot be referred to that genus because both anther-cells are perfect, because the corolla is very markedly 2-labiate in place of being sub-equally 5-lobed, and because the two stigmatic lobes are equally large.

The nearest ally of our plant seems to be the American genus *Conopholis* Wallr., with which it agrees as regards corolla and, except that they are not exserted, as regards stamens, but from which it differs in having an equally 5-lobed calyx and a 2-lobed stigma. From

Boschniackia C. A. Mey., it differs somewhat as regards corolla and very greatly as regards stamens. From *Xylanche* Beck, (*Boschniackia himalaica* H. f. & T.) it further differs in having 2 carpels, not 3. From all the genera mentioned it differs markedly as regards inflorescence, which in those is spicate, in our plant paniculate.

GLEADOVIA RUBORUM *Gamble & Prain.*—A fleshy herb about 6 in. high of which only about one half epigaeal; *root-stock* very thick especially where attached to the host; *scales* ovate, the lower rounded, the upper acute sometimes 2-fid. *Flowers* paniculate; bract solitary, ·7 in. long, sheathing, rounded, pedicel stout ·35 in. long, bracteoles 2, ·7—1 in long, spathulate, acute, concave. *Calyx* light-red, tubular, somewhat inflated, regularly 5-lobed, 1—1·2 in. long, lobes pale. *Corolla* red with darker veins, tube as long as calyx, slightly curved, distinctly two-lipped; upper lip of 2 connate lobes, rounded, slightly dentate, lower of 3 narrow, spathulate, subequal, acutely dentate lobes. *Stamens* 4, geniculate at point of insertion, anthers elongate, spurred, connective produced in a 2-fid cone, hairy above. *Ovary* 1-celled, ovate-cylindric; style long, incurved at apex; stigma of 2 broad semi-orbicular lobes depressed in the centre; placentæ 2 pairs, free below and above, confluent in the middle, diffuse; ovules very many. *Seeds* very many, minute.

N. W. HIMALAYA:—Bodyar Jaunsar, 8–9,000 ft.; on the northern slopes in very shady woods of Fir and Deodar on roots of wild Raspberry (*Rubus niveus*); very scarce, *Gleadow! Gamble! Duthie! Duthie's Collectors!*

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XVI.—*Materials for a Carcinological Fauna of India. No. 6. The Brachyura Catometopa, or Grapsoidea.—By* A. Alcock, M.B., C.M.Z.S., *Superintendent of the Indian Museum.*

[Received 25th June; Read 4th July.]

In treating the Catometopes I have in the main followed the scheme of Milne Edwards (*Annales des Sciences Naturelles* for 1852 and 1853) as modified by Dana, and I may introduce this paper with a statement of the points at which it deviates from the former of those classical works.

In the first place, following Dana and most subsequent authors, I have evicted the *Telphusidæ.* With them must also go *Gecarcinucus*, which is an undoubted Telphusoid, although it is persistently ranked with the *Geocarcinidæ.*

Again I have followed the lead of Dana in his treatment of the *Gonoplacæa* of Milne Edwards, the genera of which are distributed among the *Ocypodidæ* and the Sesarmine *Grapsidæ*, while *Gonoplax* itself is relegated to the *Carcinoplacidæ.*

This step necessitates a considerable enlargement of Milne Edwards' group of *Carcinoplacinæ*, and a reconstruction of his *Ocypodinæ*, and in carrying this out I have in the main followed Dana's admirable system.

The isolation of *Myctiris* as an independent family, which was first suggested by Dana, is here accented, but at the same time I fully agree with Milne Edwards estimate of this singular form as a "satellite" of the Ocypodoids.

In grouping the genera of the *Grapsidæ* I have departed very little from the arrangement of Milne Edwards, who recognized—though his successors have ignored it—the independence of the *Varuna* group.

I have adopted Dana's family of *Geocarcinidæ*, but with some hesitation, for Milne Edwards' estimation of the group as a subfamily of *Grapsidæ* has much to recommend it.

I gladly follow Milne Edwards in recognizing the *Hymenosoma* group as a *tribu principale* not distantly related to the Ocypodes and quite distinct from and independent of the *Pinnoteres* group.

As regards additions to the *Catometopa* as known to and recognized by Milne Edwards, I may mention the *Rhizopinæ* (Stimpson, Miers), the *Hexapodinæ*, the *Palicidæ* (which include *Cymopolia* formerly classed with the Dorippidæ), and the new family *Ptenoplacidæ*.

From the system of Dana I would dissent only in separating the *Hymenosoma*-group from the *Pinnoteridæ*; in enlarging the *Scopimerinæ* (=*Dotinæ*) at the expense of the *Ocypodidæ*; in splitting the *Grapsinæ* into two equal groups,—one round *Grapsus*, the other round *Varuna*; and in removing *Gecarcinucus* from the *Geocarcinidæ*.

The scheme of classification proposed by Miers seems to me to, too often, disregard natural relations without facilitating the recognition of species by way of compensation.

The most conspicuous instance is the family *Pinnoteridæ*, in which we find *Pinnoteres* and its kindred included with such undoubted Ocypodoids as *Dotilla* and *Scopimera*, with *Mictyris*, with *Hymenosoma* and its allies, and finally with *Hexapus* whose affinities are quite clearly with the *Rhizopinæ*.

Again by the exclusion of *Scopimera* and *Dotilla* and by the inclusion of the *Gonoplacidæ*, Miers family of *Ocypodidæ* becomes unnatural and incomplete.

I follow Miers in treating the *Rhizopinæ* as a subfamily of *Carcinoplacidæ*.

Ortmann obviates some difficulties by separating *Gonoplax* and *Ommatocarcinus* from the *Carcinoplacidæ* as a distinct family, and by altogether removing the *Hymenosomidæ* from the Catometopes. By the latter step his *Pinnoteridæ* gain in natural value, as they further do by the restoration of *Scopimera* and *Dotilla* to their place among the

Ocypodoids; so that both his *Pinnoteridæ* and *Ocypodidæ* are far more natural families than those of Miers. I am doubtful, however, whether Ortmann has assigned its full rank to *Mictyris*, or their proper place to the *Hexapodinæ.*

The Catometope crabs of the Indian fauna number about 140, of which 136 are noticed in the present paper. Of these, 31 are new to science, and include 2 species of *Libystes*, 1 of *Psopheticus*, 2 of *Litochira*, 1 of *Notonyx*, 1 of *Ceratoplax*, 1 of *Typhlocarcinus*, 2 of *Pinnoteres*, 3 of *Dotilla*, 2 of *Scopimera*, 1 of *Clistostoma*, 1 of *Tylodiplax*, 1 of *Elamena*, 2 of *Hymenicus*, 2 of *Ptychognathus*, 1 of *Pyxidognathus*, 3 of *Sesarma*, 2 of *Palicus (Cymopolia)*, and 1 of each of the following new genera, *Typhlocarcinodes* (Rhizopinæ), *Lambdophallus* (Hexapodinæ), and *Chasmocarcinops* (Asthenognathinæ).

The new species are, for the most part, either little crabs that are liable to be overlooked, or inhabitants of depths which, though moderate, are inaccessible to ordinary collectors.

As heretofore, most of the new species come from the copious collections of the "Investigator" and will be duly figured in the *Illustrations of the Zoology of the R.I.M.S. Investigator.*

Tribe CATOMETOPA.

Quadrilatera, Latreille (pt.), Fam. Nat. du Règne Anim. p. 269.

Catomètopes, Milne Edwards (pt.), Hist. Nat. Crust. II. p. 1.

Cancri (pt.), *Ocypodes*, *Grapsi*, *Pinnotheridea*, De Haan, Faun. Japon. Crust.

Ocypodidæ, Milne Edwards (pt.), Ann. Sci. Nat., Zool., (3) XVIII. 1852, pp. 128, 140.

Grapsoidea, Dana, U. S. Expl. Exp.—Crust. pt. I. pp. 67, 306.

Catometopa, Miers, Challenger Brachyura, p. 216.

Catometopa, Ortmann, Zool. Jahrb., Syst. VII. 1893-94, pp. 411, 683, plus *Majoidea Hymenosomidæ*, p. 31: and in Bronn's Thier Reich, V. ii. *Arthropoda*, pp. 1165, 1168, 1175.

The carapace is variable, but commonly and typically it is transverse, more or less quadrate, with large branchial and small and indistinct hepatic regions and a broad front. The front also is variable in form, but typically it is much deflexed.

The orbits, typically, occupy the whole or the greater part of the anterior border of the carapace on either side of the front. The typical fold of the antennules is transverse; but it may be oblique, or nearly vertical, and in a few cases there are no distinct fossæ at all into which these appendages can fold.

The epistome, typically, is extremely short, but occasionally it is of considerable length. The buccal orifice is typically, but by no means always, square cut.

The palp of the external maxillipeds usually articulates either at the summit, or at or near the external angle, of the merus; but often, as in almost the whole family *Gonoplacidæ*, it articulates distinctly at the antero-internal angle.

The genital ducts of the male usually perforate the sternum opposite the last pair of legs: if, as happens in the family *Gonoplacidæ*, they perforate the bases of the last pair of legs, *they pass forwards to their destination in a groove in the sternum.*

The abdomen of the male is very often narrow at its base and so does not cover all the space between the last pair of legs.

The branchiæ are often fewer than 9—from 8 to 6—on either side: their efferent channels open on either side of the palate.

The *Catometopa* may be divided into 9 families. One of these, the *Gonoplacidæ*, so closely approaches the Cyclometope family *Xanthidæ* that such Xanthoid forms as *Geryon* and *Camptoplax* have by some authors been included in it, while, on the other hand, some of its constituent genera, such as *Gonoplax* and *Carcinoplax*, have been ranged among the Cyclometopes.

Three other families, namely, the *Grapsidæ*, the *Geocarcinidæ*, and the *Ocypodidæ*, include the typical Catometopes, upon which our general conception of the group is founded.

The remaining five families are more or less aberrant, they are the *Pinnoteridæ*, the *Mictyridæ*, the *Hymenosomidæ*, the *Palicidæ*, and the *Ptenoplacidæ*.

Of these aberrant families, the *Pinnoteridæ* are probably most nearly related to the *Gonoplacidæ*, the *Mictyridæ* to the *Ocypodidæ*, and the *Palicidæ* to the *Grapsidæ*.

The true position of the *Hymenosomidæ* appears to me to be still doubtful. Many authors place them near the *Pinnoteridæ* and *Mictyridæ*, and I think that their most natural place is alongside the *Mictyridæ*. Ortmann alone boldly removes them from the Catometope grade altogether and unites them with the Oxyrhynchs, which I think is a decided mistake.

There remains the family *Ptenoplacidæ*, which includes the single species *Ptenoplax notopus*. This, though it has a superficial resemblance to *Macrophthalmus*, is remote from that genus in many important characters, and, though it has no look of *Hexapus*, yet shows an attraction to *Hexapus* and *Lambdophallus* that can hardly be accidental.

The 9 families may be characterized as follows, their compass in relation to the schemes of other authors will be noted in the sequel :—

Family GONOPLACIDÆ. Marine Catometopes closely resembling Cyclometopes. The palp of the external maxillipeds articulates at or near the antero-internal angle of the merus, never at the antero-external angle or at the middle of the anterior border : the exognath of the external maxillipeds is of normal size and is not concealed. The interantennular septum is a thin plate. The division of the orbit into two fossæ is not accented.

Family GRAPSIDÆ. Littoral (rock-haunting), or pelagic (drift-weed and timber-haunting), or estuarine and paludine, or fluviatile, or rarely terrene Catometopes. The palp of the external maxillipeds articulates either at the antero-external angle, or at the summit, or at the middle of the anterior border of the merus : the exognath is either abnormally slender or abnormally broad. The interantennular septum is very broad. The division of the orbit into two fossæ is accented. [Front of great breadth : carapace usually quadrilateral, with the lateral borders either straight or very slightly arched, and the orbits at or very near the antero-lateral angles : the buccal cavern is square and there is generally a gap, which is often large and rhomboidal, between the external maxillipeds]. Male openings sternal.

Family GEOCARCINIDÆ. Terrene Catometopes (Land-crabs). The palp of the external maxillipeds articulates either at the antero-external angle or at the middle of the anterior border of the merus (but is sometimes, though never in any Indian species, completely hidden behind the merus) : the exognath is slender and inconspicuous (sometimes more or less concealed) and sometimes carries no flagellum. The interantennular septum is very broad and the antennular fossæ are narrow. The front is of moderate breadth and always strongly deflexed : the carapace is more or less transversely oval, *the antero-lateral borders being strongly arched and the fronto-orbital border being very much less than the greatest breadth of the carapace.* In all the Indian forms there is a wide rhomboidal gap between the external maxillipeds. Male openings sternal.

Family OCYPODIDÆ. Amphibious littoral and estuarine crabs, burrowing, and commonly gregarious. The palp of the external maxillipeds is coarse, and articulates at or near the antero-external angle of the merus : the exognath is generally slender and often more or less concealed. The interantennular septum is generally broad, but in one subfamily (*Macrophthalminæ*) is a thin plate. The front is usually of no great breadth, and is often a narrow lobe more or less deflexed. The orbits occupy the whole anterior border of the carapace outside the front, and their outer wall (between the far ends of the upper and lower borders) is often defective. The buccal cavern is usually large and a little narrower in front than behind, the external maxillipeds are foliaceous and usually completely close it, but if they do not they never leave between them a wide rhomboidal space exposing the mandibles. The abdomen of the male is narrow. Male openings sternal.

Family PINNOTERIDÆ. Small crabs, usually living as commensals in the mantle-cavity of Bivalve Mollusks or Ascidians, in the cloaca of Holothurians, in worm-tubes, or in coral-stocks, and hence often exhibiting degeneration of some of the organs of special sense. The external maxillipeds vary: the merus, though often very large, is never quadrilateral, and never carries the palp distinctly at the antero-internal angle: the ischium is often small, and is sometimes absent or indistinguishably fused with the merus, in which case the merus lies with its long axis directed obliquely or almost transversely inwards: the exognath is small and more or less concealed. The interantennular septum, when distinguishable, is a thin plate. [The front is narrow, the eyes and orbits very small, the corneæ sometimes obsolescent: the antennules and antennæ are usually very small and cramped. The buccal cavern is short and of great breadth, being commonly semicircular in outline. The male abdomen is very narrow]. Male openings sternal.

Family MICTYRIDÆ. Amphibious Catometopes resembling the *Ocypodidæ* in habits. The buccal cavern is of enormous size and is completely closed by the enormous foliaceous convex external maxillipeds, whose coarse palp articulates with the antero-external angle of the merus, and whose short slender exognath is entirely concealed and carries no flagellum. The interantennular septum is narrow. The orbits are represented by a small post-ocular spine, the eyes being quite unconcealed. [Carapace elongate-globose: front a narrow declivous lobe: the rudimentary antennular flagella fold nearly vertically, and are a good deal concealed by the front: the abdomen of the male resembles that of the female and covers the greater part of the sternum. No membranous spaces (*tympana*) on the meropodites of the legs or on the sternum]. Male openings sternal.

Family HYMENOSOMIDÆ. Small marine and estuarine Catometopes having a curious superficial resemblance to some of the Oxyrhynch crabs of the Inachine subfamily, a resemblance heightened by the fact that the epistome is sometimes nearly as long as broad. The palp of the external maxillipeds articulates near the antero-external angle of the merus, but as the antero-internal angle of the merus is sometimes truncated the true relations of the palp are often not quite clear: the exognath is slender and partly or entirely concealed. There are no orbits and the eyes are exposed and little retractile. [Carapace thin, flat, triangular or subcircular, not very well calcified, usually produced to form a horizontal rostrum. Antennular fossæ shallow and ill defined. Antennal peduncle slender. Buccal cavern square, the ischium of the external maxillipeds well developed]. Male openings sternal.

Family PALICIDÆ. Small Catometopes having a sort of *Dorippe* appearance. The Indian members of the family are found among coral- and shell-shingle, at a moderate depth, and have a kind of protective resemblance to an eroded flake of coral rock. The external maxillipeds close the buccal cavern ventrally but not anteriorly: their merus is a very small joint articulating with the retreating antero-external angle of the ischium, and carrying the palp at the middle of the oblique-lying anterior (or inner) border, their exognath is not concealed and is rather broad. The interantennular septum is a thin plate. The orbit has 2 or 3 deep gaps in the upper border. Front of moderate breadth, little or not at all deflexed: antennal flagella of good length: epistome absent: abdomen of male narrow. Compared with the other 3 pairs, *the 4th (last) pair of legs, which are dorsally situated, are rudimentary* in all the Indian species. Male openings sternal: *female openings placed far forward on the sternal segment corresponding with the first pair of ambulatory legs* (2nd peræopods).

Family PTENOPLACIDÆ. Represented by an aberrant Catometope found only in Indian Seas at a depth of 100 to 250 fathoms. The external maxillipeds are slender and subpediform, not nearly covering the buccal cavity: their palp articulates with the summit of the slender merus: their exognath is of normal size and form, and is not concealed. The interantennular septum is a thin rudimentary plate. The orbits are very incomplete below. The front is a narrow, little deflexed lobe. No distinct antennular fossæ. Antennal flagella of good length. No epistome. Abdomen of male narrow. Compared with the other 3 pairs, *the last (fourth) pair of legs are rudimentary, being also placed close together dorsally: the last segment of the sternum is also rudimentary.*

The male openings are in the bases of the last pair of legs but the ducts run forward in a sternal groove.

Most of these families can be further split into subfamilies, as is shown in the following scheme :—

Family GONOPLACIDÆ, Dana.

Gonoplaciens, Milne Edwards (pt.), Hist. Nat. Crust. II. 56.

Gonoplacés Cancéroides plus *Carcinoplacinæ*, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII. 1852, pp. 162, 164.

Gonoplacidæ, Dana, U. S. Expl. Exp. Crust. pt. I. pp. 308, 310.

Carcinoplacinæ plus *Gonoplacinæ* plus *Hexapodinæ*, Miers, Challenger Brachyura, pp. 222, 237, 275.

Carcinoplacini, Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 683.

Carcinoplacidæ plus *Gonoplacidæ* plus *Hexapodinæ*, Ortmann in Bronn's Thier Reich, *tom. cit.* pp. 1175, 1176, 1177.

This family may be divided into the 5 following subfamilies :—

Subfamily I. PSEUDORHOMBILINÆ (*Carcinoplacinæ* Miers, *Carcinoplacidæ* Ortmann). Carapace Xanthoid, the regions seldom well defined: front usually of good breadth and square cut, often little deflexed: eyes and orbits of normal size and form, the eyes well pigmented and the eyestalks normally movable except in certain deep-sea genera: the antennules fold transversely: antennal flagella of fair length. Epistome well defined: buccal cavern square-cut and usually completely closed by the external maxillipeds, which have a subquadrate merus. The base of the male abdomen covers the whole space between the last pair of legs. Male openings not sternal.

Subfamily II. GONOPLACINÆ (*Gonoplacinæ* Miers, *Gonoplacidæ* Ortmann). The anterior border of the subquadrate carapace is entirely occupied by the square-cut front and orbits, the front being either narrow or of fair breadth, and the orbits being long narrow trenches for the elongate eyestalks. In other respects similar to the *Pseudorhombilinæ.*

Subfamily III. PRIONOPLACINÆ (not represented in India). Differs from *Pseudorhombilinæ* only in the form of the male abdomen, which is not broad enough at base to cover all the space between the last pair of legs.

Subfamily IV. RHIZOPINÆ (*Rhizopinæ* Miers, Ortmann). With the exception of one species (*Notonyx nitidus*) the eyestalks are fixed, and very often the "cornea" is minute or obsolete: the lower border of the orbit has a tendency to run downwards towards the epistome. The carapace usually has its antero-lateral corners cut away and rounded off: the front may be square-cut and broad, but is more often narrow and more or less distinctly bilobed and deflexed. The antennules may be of fair size and transversely folded, but more often, owing to the narrowness of the front, they are cramped, and fold obliquely: sometimes they cannot be folded in their fossæ at all. Antennal flagella usually short. The epistome may either be well defined and prominent, or ill defined and sunken. The buccal cavern may be squarish, but it often is decreased in breadth anteriorly: the external maxillipeds have a square merus and may completely close the buccal cavern, or there may be a gap between them. The male abdomen does not nearly cover the space between the last pair of ambulatory legs. Male openings sternal.

Subfamily V. HEXAPODINÆ (*Pinnoteridæ-Hexapodinæ* Miers, Ortmann). *Only three pairs of legs besides the chelipeds, the last segment of the sternum also aborted.* Carapace much broader than long with the antero-lateral corners cut away and rounded off. Front narrow: eyes, orbits and antennæ small: the antennules fold transversely. Epistome well defined: buccal cavern with the sides a little anteriorly-convergent, or not, nearly closed by the external maxillipeds, whose merus is either quadrate or has the antero-external angle rounded off. The male abdomen does not nearly fill the space between the last pair of ambulatory legs. Male openings sternal.

Family PINNOTERIDÆ, Edw.

Pinnotheridæ, De Haan (part), Faun. Japon., Crust., pp. 5, 34.

Pinnothériens, Milne Edwards (part), Hist. Nat. Crust. II. 28.

Pinnotherinæ, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII. 1852, p. 138, and XX. 1853, p. 216: Dana, U. S. Expl. Exp., Crust. pt. I. pp. 378, 379: Miers, Challenger Brachyura, p. 274: Ortmann, Zool. Jahrb., Syst., VII. 1893–94, p. 691; and in Bronn's Thier Reich, *tom. cit.* p. 1177.

I propose, with some diffidence, as I have not examined enough of the forms included, to divide this family into 4 subfamilies:—

Subfamily I. PINNOTERINÆ. Ischium of the external maxillipeds either rudimentary, or indistinguishably fused with the merus to form a single piece which is usually oblique, sometimes transverse. Usually the carapace is not transverse and the palp of the external maxillipeds not so large as the merus-ischium.

Subfamily II. PINNOTHERELINÆ. Ischium of the external maxillipeds distinct and independent, but smaller than the merus, the latter joint little oblique. Usually the carapace is broadly transverse, and often the palp of the external maxillipeds is the largest part of these appendages.

Subfamily III. XENOPHTHALMINÆ. Ischium of the external maxillipeds distinct, as large as or larger than the merus, the latter joint little oblique, the palp of ordinary size. *The orbits are narrow chinks situated dorsally with their long axis at right angles to the anterior border of the carapace.*

Subfamily IV. ASTHENOGNATHINÆ (*Asthenognathidæ* Stimpson). External maxillipeds weak and slender, not nearly meeting across the buccal cavern, the ischium distinct and larger than the merus, the palp of ordinary size. Eyes in the normal position.

Family GRAPSIDÆ, Dana.

Grapsoidiens, Milne Edwards, Hist. Nat. Crust. II. 68.

Grapsinæ, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. p. 136 and XX. p. 163.

Grapsidæ, Dana, U. S. Expl. Exp., Crust. p. 329: Miers, Challenger Brachyura, p. 252: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 699, and in Bronn's Thier Reich, *tom. cit.* p. 1177.

This family can be divided into four well characterized subfamilies as follows:—

Subfamily I. GRAPSINÆ (*Grapsacea*, Edw., *Grapsinæ* in part, Dana, Kingsley, Miers, Ortmann). Front strongly deflexed: the lower border of the orbit runs downwards towards the buccal cavern: antennal flagellum very short: the external maxillipeds leave a wide rhomboidal gap between them, they are not traversed by any oblique hairy crest, their palp articulates at the antero-external angle of the merus, and their exognath is very slender and is exposed throughout. The male abdomen fills all the space between the last pair of ambulatory legs.

Subfamily II. VARUNINÆ (*Varunacea* and *Cyclograpsacea* part, Milne Edwards; *Grapsinæ* in part, Dana, Kingsley, Miers, Ortmann). Front moderately or little deflexed, sometimes sublaminar: the suborbital crest, which supplements the defective lower border of the orbit, is rather distant from the orbit and usually runs nearly in a line with the anterior border of the epistome: antennal flagellum usually of good length: the external maxillipeds do not often gape widely, though usually there is something of a gap, they are not traversed by any oblique hairy crest, their palp articulates with the middle of the anterior border of the merus, and their exognath is generally broad and is exposed throughout. The male abdomen, though not narrow, rarely covers all the space between the last pair of ambulatory legs.

Subfamily III. SESARMINÆ. (*Sesarmacea* and *Cyclograpsacea* part, Milne Edwards; *Sesarminæ*, Dana, Kingsley, Miers, Ortmann). Front strongly deflexed: the lower border of the orbit commonly runs downwards towards the angle of the buccal cavern: the external maxillipeds leave a wide rhomboidal gap between them, *an oblique hairy crest traverses them from a point near the antero-external angle of the ischium to a point near the antero-internal angle of the merus,* their palp articulates either at the summit or near the antero-external angle of the merus, and their exognath is slender and either partly or almost entirely concealed. The male abdomen either fills or does not quite fill all the space between the last pair of ambulatory legs. Antennal flagella variable.

Subfamily IV. PLAGUSIINÆ. (*Plagusiacea*, Milne Edwards; *Plagusiinæ*, Dana, Kingsley, Miers, Ortmann). The front is cut into lobes or teeth by the antennular fossæ, which are visible in a dorsal view as deep clefts: the lower border of the orbit curves down into line with the prominent anterior border of the buccal cavern: the external maxillipeds do not completely close the buccal cavern but they do not leave a wide rhomboidal gap, they are not traversed by any oblique hairy crest, their palp articulates near the antero-external angle of the merus, and their slender exposed exognath has no flagellum. The antennal flagella are short. The male abdomen fills all the space between the last pair of legs.

Family GEOCARCINIDÆ, Dana.

Gécarciniens, Milne Edwards, Hist. Nat. Crust. II. 16.

Gecarcinacea, Milne Edwards (pt.), Ann. Sci. Nat., Zool., (3) XX. 1853, p. 200.

Gecarcinidæ, Dana (pt.), U. S. Expl. Exp. Crust. pt. I. p. 374.

Geocarcinidæ, Miers, Challenger Brachyura, p. 216.

Gecarcinidæ, Ortmann (pt.), Zool. Jahrb. Syst. VII. 1893-94, pp. 699, 732, and in Bronn's Thier Reich, *tom. cit.* p. 1178.

I think it inadvisable to subdivide this small group, which Milne Edwards, with more justice, regarded as itself only a subfamily of the *Grapsidæ*.

Gecarcinucus is a Telphusoid and should not be referred here. *Epigrapsus* and *Grapsodes*, if they are distinct from one another, belong here rather than to the *Grapsidæ*.

Family PALICIDÆ (*vel* CYMOPOLIDÆ).

This little and aberrant family is probably best treated as an appendage to the *Grapsidæ*.

Family OCYPODIDÆ, Ortmann (pt.).

Ocypodiens, Milne Edwards, Hist. Nat. Crust. II. p. 39.

Ocypodinæ, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII. 1852, p. 140, plus *Gonoplacés Vigils* (pt.), p. 155.

Macrophthalmidæ, Dana, U. S. Expl. Exp. Crust. pt. I. pp. 308, 312.

Ocypodinæ, Miers (pt.), Challenger Brachyura, p. 236, and *Myctirinæ* (pt.), p. 275.

Ocypodidæ, Ortmann (pt.), Zool. Jahrb., Syst., VII. 1893-94, pp. 700, 741; and in Bronn's Thier Reich, *tom. cit.*, p. 1179.

In the treatment of this family nothing can be added to the scheme of Dana, where they are divided into 3 sub-families as follows :—

Subfamily I. OCYPODINÆ (*Ocypodiacés Ordinaires* Edw., *Ocypodinæ* Dana (pt.), Miers (pt.), Ortmann). Carapace deep, subquadrilateral, the regions seldom well defined : front narrow deflexed, commonly a mere lobe between the long eyestalks : antennular flagellum small, folding obliquely or almost vertically, the interantennular septum broad : the external maxillipeds completely close the buccal cavern, their exognath is inconspicuous but is not, or not entirely, concealed, and may either have, or be destitute of, a flagellum : chelipeds remarkably unequal either in both sexes or in the male only. *There is an orifice or recess, the edge of which is thickly fringed with hair, between the bases of the 2nd and 3rd pairs of true legs.*

Subfamily II. SCOPIMERINÆ (*Ocypodiacés Globulaires* Edw., *Dotinæ* Dana, *Myctirinæ* (pt.) Miers, Ortmann). Carapace very deep, cuboidal or globose : front narrow deflexed, commonly a mere lobe : antennular flagellum rudimentary, folding nearly vertically and hidden beneath the front, interantennular septum broad : buccal cavity large, sometimes enormous, completely closed by the external maxillipeds which are commonly very prominent and have small linear concealed exognaths with or without a flagellum : chelipeds equal or subequal in both sexes. *Orbits shallow. Curious membranous spaces known as "tympana" exist on the meropodites of the legs and often of the chelipeds also; and sometimes on some of the segments of the sternum.* No hairy recesses between the bases of the 2nd and 3rd pairs of true legs.

Subfamily III. MACROPHTHALMINÆ. (*Gonoplacés Vigils* pt. Edw., *Macrophthalminæ* Dana, Miers, Ortmann). Carapace usually quadrilateral, broader than long (sometimes more than twice as broad as long), flattish and not very deep, the regions usually well defined: front variable, but never very broad: antennules with a well developed flagellum that folds transversely, interantennular septum very narrow: eyestalks usually elongate: the external maxillipeds do not always meet across the buccal cavern, though the gap between them is never very wide, their exognath is not, or not entirely, concealed and has a flagellum: chelipeds usually subequal. No special recess between the bases of any of the legs.

Family MICTYRIDÆ, Dana.

Pinnothériens, Milne Edwards (pt.), Hist. Nat. Crust. II. 39.

Myctiroidea, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 154.

Mictyridæ, Dana, U. S. Expl. Exp., Crust. pt. I, pp. 309, 389.

Pinnotheridæ-Myctirinæ, Miers (pt.), Challenger Brachyura, p. 275; Ortmann (pt.) in Bronn's Thier Reich, *tom. cit.*, p. 1179.

Ocypodidæ-Myctirinæ, Ortmann (pt.), Zool. Jahrb., Syst. VII. 1893-94, pp. 742, 747.

There can be little question that Milne Edwards was right in reckoning *Mictyris* as a "satellite" of the *Ocypodidæ*, or that Dana's plan of separating them as a distinct family is fully justified. The affinities which several authors find between *Mictyris* and the *Pinnoteridæ* are by no means easy to recognize.

Family HYMENOSOMIDÆ, Ortmann.

Pinnothériens, Milne Edwards (pt.), Hist. Nat. Crust. II. 39.

Hymenosominæ, Milne Edwards, Ann. Sci. Nat., Zool. (3) XX. 1853, p. 221.

Pinnotheridæ-Hymenicinæ, Dana, U. S. Expl. Exp., Crust. pt. I. pp. 379, 384.

Pinnotheridæ-Hymenosominæ, Miers, Challenger Brachyura, p. 275.

Majoidea-Hymenosomidæ, Ortmann, in Bronn's Thier Reich, *tom. cit.*, p. 1168.

Three types seem to be distinguishable in this family: in one (*e.g. Hymenosoma*) there is no epistome and the external maxillipeds almost encroach on the bases of the antennules, which appendages are not concealed by the front; in the second (*e.g. Halicarcinus*) there is an epistome of considerable length, but the antennules are still unconcealed by the front; in the third (*e.g. Hymenicus*) there is a long epistome and the antennules are quite concealed by the front.

Family PTENOPLACIDÆ.

This family has no very close connexions with any of the others although it is an undoubted Catometope.

The following is a list of all the Catometope genera known to me arranged according to the foregoing scheme. As in previous papers, the genera known to me by autopsy are marked with an asterisk, and all the Indian genera are printed in roman type.

Family GONOPLACIDÆ, Dana.

Subfamily I. PSEUDORHOMBILINÆ, *nov.*

? *Brachygrapsus*, J. S. Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 203.

Bathyplax, A. Milne Edwards, Bull. Mus. Comp. Zool., VIII, 1880-81, p. 16 : Miers, Challenger Brachyura, p. 230.

? *Camptandrium*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 106.

* Carcinoplax (=Curtonotus).

* Catoptrus (=Goniocaphyra).

? *Cryptocœloma*, Miers, Zool. H. M. S. Alert, p. 227.

* Eucrate.

Freyvillea, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII, 1880-81, p. 15.

Heteroplax, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 94.

* Libystes.

* Litochira.

* Pilumnoplax.

* ? Platypilumnus.

* Pseudorhombila.

* Psopheticus.

Subfamily II. PRIONOPLACINÆ, *nov.*

Eucratoplax, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII, 1880-81, p. 17.

Eucratopsis, Smith, Amer. Journ. Sci. XLVIII, 1869, p. 391, and Trans. Connect. Acad. II. 1871-73, p. 35.

Euryplax, Stimpson, Ann. Lyc. Nat. Hist., New York, VII, 1862, p. 60.

Glyptoplax, Smith, Trans. Connect. Acad. II, 1871-73, p. 164.

Oediplax, Mary J. Rathbun, P. U. S. Nat. Mus. XVI, 1893, p. 241.

Panoplax, Stimpson, Bull. Mus. Comp. Zool. II, 1870-71, p. 151.

Prionoplax, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII, 1852, p. 163.

Speocarcinus, Stimpson, Ann. Lyc. Nat. Hist., York, VII, 1862, p. 58.

Subfamily III. GONOPLACINÆ, Miers.

* Gonoplax, Leach, Trans. Linn. Soc. XI, 1815, p. 323: Miers, Challenger Brachyura, p. 245.

Ommatocarcinus, White, in Voy. H. M. S. Rattlesnake, II, p. 393; Miers, Challenger Brachyura, p. 246.

Subfamily IV. RHIZOPINÆ, Stimpson, Miers.

* Camatopsis.

* Ceratoplax.

? *Chasmocarcinus*, Mary J. Rathbun, Bull. Nat. Hist. Iowa, 1898, p. 284.

* Hephthopelta.

* Notonyx.

Rhizopa, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 95.

* Scolopidia (=Hypophthalmus).

* Typhlocarcinus.

* Typhlocarcinodes.

* Xenophthalmodes.

Subfamily V. HEXAPODINÆ, Miers.

Amorphopus, Bell, Journ. Linn. Soc., Zool., III, 1859, p. 27.

* *Hexapus*, De Haan, Faun. Japon. Crust., p. 35.

* Lambdophallus.

Thaumastoplax, Miers, Ann. Mag. Nat. Hist. (5) VIII, 1881, p. 261.

Family PINNOTERIDÆ, Edw.

? Subfamily I. PINNOTERINÆ, *nov.*

Cryptophrys, Mary J. Rathbun, P. U. S. Nat. Mus. XVI, 1893, p. 250.

Dissodactylus, S. I. Smith, Trans. Connect. Acad. II, 1871–73, p. 172.

Durckheimia, de Man, Zool. Jahrb., Syst., 1889, p. 442.

Fabia, Dana, Proc. Ac. Nat. Sci. Philad. 1851, p. 253, and U. S. Expl. Exp., Crust. pt. I. p. 382.

? *Holothuriophilus*, Nauck, Zeits. Wiss. Zool. XXXIV, 1880, pp. 24, 66.

Ostracoteres, Milne Edwards, Ann. Sci. Nat., Zool., (3) XX, 1853, p. 219.

? *Parapinnixa*, Holmes, Proc. Calif. Acad. IV, 1893-94, pp. 565, 587.

Pinnaxodes, Heller, Novara Crust., p. 67.

* Pinnoteres.

? *Scleroplax*, Mary J. Rathbun, P. U. S. Nat. Mus. XVI, 1893, p. 250.

* Xanthasia.

? Subfamily II. PINNOTHERELINÆ, *nov.*

? *Malacosoma*, de Man, Notes Leyden Mus. I, 1879, p. 67.

Opisthopus, Mary J. Rathbun, P. U. S. Nat. Mus. XVI, 1893, p. 251.

Pinnixa, White, Ann. Mag. Nat. Hist. XVIII. 1846, p. 177 (= *Tubicola*, Lockington, Proc. Calif. Acad. VII. 1876, p. 55).

Pinnotherelia, Milne Edwards and Lucas, in Voy. Amér. Mérid., Crust. p. 24 (1843).

Pseudopinnixa, Ortmann (*nec* Holmes), Zool. Jahrb., Syst. VII, 1894, p. 694.

* Tetrias.

? *Tritodynamia*, Ortmann, Zool. Jahrb., Syst. VII, 1194, p. 692.

? Subfamily III. XENOPHTHALMINÆ, nov.

* Xenophthalmus.

? Subfamily IV. ASTHENOGNATHINÆ, Stimpson.

Asthenognathus, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 107.

* Chasmocarcinops.

Family OCYPODIDÆ, Ortmann, emend.

Subfamily I. OCYPODINÆ, Dana.

Acanthoplax, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII, 1852, p. 151.

* Gelasimus.

**Heloecius*, Dana, Amer. Journ. Sci., (2) XII, 1851, p. 286, and U. S. Expl. Exp., Crust. pt. I. p. 319.

* Ocypoda.

Subfamily II. MACROPHTHALMINÆ, Dana.

* Clistostoma.

Chænostoma, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 97.

Euplax, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII, 1852, p. 160; Miers, Challenger Brachyura, p. 251.

Hemiplax, Heller, Novara Crust. p. 40: Miers, Challenger Brachyura, p. 250.

*Macrophthalmus.

Paraclistostoma, de Man, Zool. Jahrb., Syst., VIII, 1895, p. 580.

*Tylodiplax.

Subfamily III. SCOPIMERINÆ.

*Dotilla (= *Doto*, De Haan).

Ilyoplax, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 98.

*Scopimera.

*Tympanomerus (= *Dioxippe*, de Man).

Family MICTYRIDÆ, Dana.

*Mictyris.

Family HYMENOSOMIDÆ, Ortmann.

*Elamene.

?? *Elamenopsis*, A. Milne Edwards, Nouv. Archiv. du Mus. IX, 1873, p. 324.

**Halicarcinus*, White, Ann. Mag. Nat. Hist. XVIII, 1846, p. 178: Miers, Challenger Brachyura, p. 280 (= *Liriopea*, Gay, Hist. Fis. Chile, pt. III. Zool. p. 158.

*Hymenicus

**Hymenosoma*, Leach, Milne Edwards, Hist. Nat. Crust. II, 35: Miers, Challenger Brachyura, p. 279.

Rhynchoplax, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 109.

*Trigonoplax.

Family GRAPSIDÆ, Dana.

Subfamily I. GRAPSINÆ, Dana (pt.).

*??? Epigrapsus.

*Geograpsus.

**Goniopsis*, De Haan, Faun. Japon. Crust., p. 33 (pt.): Miers, Challenger Brachyura, p. 266.

*Grapsus.

**Leptograpsus*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XX, 1853, p. 171: Miers, Challenger Brachyura, p. 257 (sub-genus of *Grapsus*).

*Metopograpsus.

Orthograpsus, Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 194 (sub-genus of *Grapsus*).

*Pachygrapsus.

Perigrapsus, Heller, Verh. zool.-bot. Ges. Wien, XII, 1862, p. 522, and Novara Crust. p. 48.

Subfamily II. VARUNINÆ, nov.

? *Acmæopleura*, Stimpson, Proc. Ac. Nat. Sci. Philad., 1858, p. 105.

**Brachynotus*, De Haan, Faun. Japon., Crust., p. 34, 1835: Miers, Challenger Brachyura, p. 264 (= *Heterograpsus*, Lucas, Expl. Sci. Algerie, Anim. Artic. I, p. 18, 1849: = *Hemigrapsus*, Dana, Amer. Journ. Sci. (2) XII, 1851, p. 288, and U. S. Expl. Exp., Crust., pt. I. p. 348).

**Cyrtograpsus*, Dana, Amer. Journ. Sci. (2) XII, 1851, p. 288, and U. S. Expl. Exp., Crust., pt. I, p. 351.

**Eriochir*, De Haan, Faun. Japon. Crust. p. 32.

Euchirograpsus, A. Milne Edwards, Bull. Mus. Comp. Zool., VIII, 1880-81, p. 18: and Milne Edwards and Bouvier "Hirondelle" (Monaco) Crust., Brachyures et Anomures, p. 46.

Glyptograpsus, S. I. Smith, Trans. Connect. Acad. II, 1871–73, p. 153.

**Planes*, Leach, Malac. Pod. Brit., Expl. of pl. xxvii, figs. 1–3, 1815 (= *Nautilograpsus*, Milne Edwards, Hist. Nat. Crust. II, 89, 1837.)

Platychirograpsus, de Man, Zool. Anz. 1896, p. 292, and Mitteil. Nat. Mus. Hamburg, XIII, 1896, p. 95.

Platygrapsus, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 104: Miers, Challenger Brachyura, p. 263 (= *Platynotus*, De Haan, Faun. Japon., Crust., p. 34).

**Pseudograpsus*, Milne Edwards, Hist. Nat. Crust. II, 81: Miers, Challenger Brachyura, p. 261 (= *Pachystomum*, Nauck, Zeits. Wiss. Zool. XXXIV, 1880, p. 67).

*Ptychognathus (= *Gnathograpsus*, A. M. Edw. = *Cœlochirus*, Nauck).

*Pyxidognathus.

Utica, White, P. Z. S. 1847, p. 85, and Ann. Mag. Nat. Hist., XX, 1847, p. 206.

*Varuna (= *Trichopus*, De Haan).

Subfamily III. SESARMINÆ, Dana.

**Aratus*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XX, 1853, p. 187.

**Chasmagnathus*, De Haan, Faun. Japon., Crust., p. 27 (= *Paragrapsus*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XX, 1853, p. 195).

*Clistocœloma.

**Cyclograpsus*, Milne Edwards, Hist. Nat. Crust., II, 77, 1837 (=*Gnathochasmus*, MacLeay, in Smith's Ill. Ann. S. Afr. p. 65, 1838).

**Helice*, De Haan, Faun. Japon., Crust, p. 28: Miers, Challenger Brachyura, p. 268.

*Metaplax (=*Rhaconotus*, Gerst.).

*Metasesarma.

Metopaulias, Mary J. Rathbun, P. U. S. Nat. Mus. XIX, 1897, p. 144.

*Sarmatium (=*Metagrapsus*, Edw.).

*Sesarma (=Holometopus, Edw.).

Subfamily IV. Plagusiinæ, Dana.

*Liolophus (=*Acanthopus*, De Haan).

*Plagusia.

Family GEOCARCINIDÆ, Dana.

*Cardiosoma (=*Discoplax*, A. M. Edw.).

*Epigrapsus.

**Gecarcinus*, Leach, Trans. Linn. Soc. XI, 1815, p. 322: Miers, Challenger Brachyura, p. 217.

*Pelocarcinus (=Gecarcoidea, Edw.,=Hylæocarcinus, W.-M.,=Limnocarcinus, de Man).

Uca, Latr., Encycl. Méthod. X, p. 685: Milne Edwards, Hist. Nat. Crust. II, 21.

Family PALICIDÆ, Rathbun (name only).

*Palicus (=*Cymopolia*).

**Crossotonotus*, A. Milne Edwards, Nouv. Archiv. du Mus. IX, 1873, p. 282, and Journ. Mus. Godeffroy, I, 1873, p. 258.

Family PTENOPLACIDÆ, Alcock.

*Ptenoplax.

Family I. GONOPLACIDÆ, Dana.

Subfamily i. Pseudorhombilinæ, Alcock.

Key to the Indian Genera.

I. Front with the edge cut straight and square, never curved, often prominent:—
    1. The fronto-orbital border, though extensive, is much less than the greatest breadth of the carapace, so that the antero-lateral borders of the carapace have

a distinctly Cancroid arch: the carapace is usually much broader than long:—

- i. Dactyli of last pair of legs styliform ………… PSEUDORHOMBILA.
- ii. Dactyli of last pair of legs compressed and ciliated:—
    - *a.* Antero-external angle of merus of external maxillipeds not particularly produced:—
        - α. Carapace transversely quadrilateral, its antero-lateral borders with few teeth ………………… CARCINOPLAX.
        - β. Carapace transversely elliptical, its antero-lateral borders with 5 or 6 teeth ………………… CATOPTRUS.
    - *b.* Antero-external angle of merus of external maxillipeds strongly produced outwards: last pair of legs sometimes paddle-like………………… LIBYSTES.

2. The fronto-orbital border is not so very much less than the greatest breadth of the carapace in extent, so that the antero-lateral borders of the carapace are either slightly arched or nearly straight: the carapace is broader than long but is not conspicuously transverse:—

- i. The antennal flagellum stands loosely in orbital hiatus:—
    - *a.* Carapace deepish, rather markedly transverse: the meri of the legs with a spine or spines on the anterior border … PSOPHETICUS.
    - *b.* Carapace shallow, depressed, and flat, little broader than long:—
        - α. Legs spiny ………………… PLATYPILUMNUS.
        - β. Legs unarmed………………… PILUMNOPLAX.
- ii. A process of the basal antenna-joint completely fills up and closes the orbital hiatus, entirely excluding the antennal flagellum …… EUCRATE.

II. Front with the edge slightly but distinctly curved, never cut straight and square; carapace and appendages in all the Indian species tomentose and hairy ………………… LITOCHIRA.

EUCRATE, De Haan.

Eucrate, De Haan, Faun. Japon. Crust. p. 36: de Man, Journ. Linn. Soc., Zool., 1887–88, p. 88: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 685.
Heteroplax, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858 (1859) p. 94.

Carapace deepish, subquadrilateral, a little broader than long, smooth and with little or no distinction of regions, convex fore and aft, very slightly so from side to side.

The extent of the fronto-orbital border is not much less than the greatest breadth of the carapace, the antero-lateral borders therefore, which are toothed, are short and but slightly arched. Front square-cut and straight, well delimited from the well-defined supra-orbital angles, usually notched or grooved in the middle line, about a third the breadth of the carapace.

Upper border of orbit with two distinct sutures. The orbital hiatus is compactly filled and closed by a process of the basal antenna-joint, so that the antennal flagellum, which is of good length, lies entirely outside the hiatus. The antennules fold transversely.

Buccal cavern square, completely closed by the external maxillipeds, the flagellum of which articulates with the inner angle of the merus. Efferent branchial channels of palate well defined.

Chelipeds subequal, much more massive and shorter, or not much longer, than the legs.

Legs slender, unarmed; the propodite and dactylus of the last pair are compressed and are usually, but not always, somewhat broadened.

In both sexes all seven abdominal segments are distinct, and in the male the third segment covers the whole width of the sternum between the bases of the last pair of legs.

Distribution: Indo-Pacific (Indian, Australian and Japanese).

Following de Man and Ortmann, I restrict the genus *Eucrate* to those species in which the orbital hiatus is completely stopped-up by a process of the basal antenna-joint.

Key to the Indian species of the genus Eucrate.

I. Antero-lateral borders of the carapace cut into four teeth (including the outer orbital angle) all of which are distinct: dactylus of last pair of legs distinctly palmulate: front grooved or notched in the middle line :—

  1. Carapace nearly smooth .... *E. crenata.*
  2. Carapace with some short transverse ridges in its antero-lateral part .... *E. crenata* var. *affinis.*

II. Antero-lateral borders cut into four teeth (including the orbital angle) of which the 2nd and 4th are hardly distinguishable: front with the median notch almost obsolete: dactylus of last pair of legs palmulate .... *E. crenata* var. *dentata.*

III. Antero-lateral borders cut into three teeth (including the orbital angle): dactylus of last pair of legs almost styliform .... *E. sexdentata.*

1. *Eucrate crenata*, De Haan.

Cancer (*Eucrate*) *crenatus*, De Haan, Faun. Japon. Crust. p. 51, pl. xv. fig. 1.
Eucrate crenata, Ortmann, Zool. Jahrb., Syst., VII. 1893–94, p. 688.
? *Pilumnoplax sulcatifrons*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858 (1859), p. 93: Tozzetti, 'Magenta' Crust. p. 102, pl. vii. fig. 2.

Carapace smooth, its length about five-sixths of its breadth. Front not quite a third the breadth of the carapace, notched and groved in the middle line. Major diameter of orbit about half the width of the front.

Antero-lateral borders of carapace cut into 4 bluntish teeth, the middle two of which are the largest: a short ridge runs on to the dorsum of the carapace from the last tooth.

Chelipeds less than twice the length of the carapace, not much longer than the legs, especially in the female: one or two teeth at the far end of the upper border of the arm, and one at the inner angle of the wrist: hand rather short and squat, the fingers, which are stout, are a little longer than the palm: there is a characteristic patch of fur at the far end of the upper surface of the wrist.

Legs smooth, the last 3 joints more or less ciliated: in the 4th (last) pair the propodite and dactylus are broader and more compressed than in the other legs.

In the Indian Museum are 3 specimens from the Andamans and 1 from Madras (besides 3 from Hongkong).

The carapace of the largest specimen is 10 millim. long and 12 millim. broad.

2. *Eucrate crenata* var. *affinis*, Haswell.

Eucrate affinis, Haswell, P. L. S., N. S. Wales, VI. 1881-82, p. 547 and Cat. Austral. Crust. p. 86: de Man, Journ. Linn. Soc., Zool. XXII. 1887-88, p. 89, pl. v. fig. 5.
? *Pseudorhombila sulcatifrons*, var. *australiensis*, Miers, Zool. H. M. S. Alert, p. 242, pl. xxiv. fig. c.

Differs from typical *E. crenata*, specimens of the same sex and of approximately the same size compared, only in the following characters:—

(1) the carapace is more sculptured, for besides the short transverse ridge on the dorsum of the carapace that runs from the last tooth of either antero-lateral border, there are similar ridges running (*a*) from the 2nd tooth of either antero-lateral border, parallel with the orbit, and (*b*) parallel with the front, near the anterior limit of the gastric region; there is also a beaded ridge running parallel with either postero-lateral border:

(2) the patch of fur on the wrist may be smaller :

A single specimen from Mergui (Anderson collection) has the carapace 12 millim. long and 15 millim. broad.

In a large series of specimens these distinctions would probably fail.

3. *Eucrate crenata* var. *dentata.*

? *Heteroplax dentatus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, (1859), p. 94 : A. O. Walker, Journ. Linn. Soc. Zool. XX. 1886–1890, p. 110.

Differs from the typical *E. crenata*, only in the following particulars :—

(1) the front is entire, the median notch being inconspicuous or absent :

(2) the outer orbital angle and the third tooth of the antero-lateral border are large and acute, while the 2nd and 4th teeth are quite inconspicuous.

In the Indian Museum are two small specimens, one from Palk Strait (the other from Hongkong).

4. *Eucrate sexdentata*, Haswell.

Eucrate sexdentata, Haswell, P. L. S., N. S. Wales, VI. 1881-82, p. 548, and Cat. Austral. Crust. p. 86.

? *Pseudorhombila vestita* var. *sexdentata*, Miers, Zool. 'Alert,' p. 240, pl. xxiv. fig. B, and Challenger Brachyura, p. 229.

Differs from *E. crenata* in the following particulars :—

(1) the only ridges on the carapace are two exceeding faint ones running parallel with the postero-lateral borders :

(2) the antero-lateral borders are cut into 3 teeth, of which the last is spine-like :

(3) the median emargination of the front is much less distinct :

(4) the chelipeds are about $1\frac{3}{4}$ times the length of the carapace and are decidedly shorter than the legs : there is only one distinct tooth near the far end of the upper border of the arm : the tooth at the inner angle of the wrist is very large and acute :

(5) the propodite and dactylus of the last pair of legs are not broader than those of the other legs.

In the Indian Museum is a single male from the Gulf of Martaban, 20 fms. The carapace is 11·5 millim. long and 13·5 millim. broad.

CARCINOPLAX, Edw.

Carcinoplax, Milne Edwards, Hist. Nat. Crust. II. 60, and Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 164 : Ortmann, Zool. Jahrb., Syst., &c., VII. 1893–94, p. 685.

Curtonotus, De Haan, Faun. Japon. Crust., p. 20 (*nom. preocc.*).

The chief differences between this genus and *Eucrate* are that (1) the carapace is very much broader, and its antero-lateral borders are much more arched, the fronto-orbital border being relatively much less extensive; (2) the supra-orbital angles are almost merged in the front, and the median notch of the front is almost obsolete; and (3) the orbital hiatus is not stopped up by any process of the basal antenna-joint.

Carapace deepish, subquadrilateral, usually much broader than long, smooth and with little or no distinction of regions, convex fore and aft, very slightly so from side to side.

The extent of the fronto-orbital border is much less than two-thirds the greatest breadth of the carapace, and the antero-lateral borders, which are toothed, are well arched. Front square-cut and straight, faintly notched or longitudinally grooved in the middle line, not very distinctly demarcated from the supra-orbital angles, from a third to a fourth, or less, the width of the carapace.

The upper border of the orbit is sinuous and may, or may not, be marked by a single faint suture line. The basal antenna joint is short and the antennal flagellum stands loosely in the open orbital hiatus. The antennules fold transversely.

Buccal cavern, palate, and external maxillipeds as in *Eucrate.*

Chelipeds subequal, much more massive and sometimes, in the adult, much longer than the legs.

Legs slender, unarmed; in the last pair the propodite and dactylus are compressed and decidedly broadened for swimming.

In both sexes all seven abdominal segments are distinct, and in the male the third segment covers the whole width of the sternum between the bases of the last pair of legs.

Distribution: Indo-Pacific (Indian, Japanese, Californian).

I exclude from the genus *Carcinoplax* those species, e.g., *setosa* and *integra*, which have the edge of the front turned down and arched: these it seems to me are better associated with *Litochira.*

Key to the Indian species of the genus Carcinoplax.

I. The long diameter of the orbit is nearly three-fourths the width of the inter-orbital space: a spine or tooth at the outer angle of the wrist. Chelipeds in the adult male very much longer than the legs ... ... *C. longimanus.*

II. The long diameter of the orbit is about half the width of the inter-orbital space: no spine or tooth at the outer angle of the wrist. Chelipeds rather shorter than the legs ... ... *C. longipes.*

5. *Carcinoplax longimanus*, De Haan.

Cancer (Curtonotus) longimanus, De Haan, Faun. Japon. Crust. p. 50, pl. vi. fig. 1.

Carcinoplax longimanus, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII. 1852, p. 164: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 688.

Carapace, length a little more than two-thirds its breadth, its surface (like that of the chelipeds) finely frosted: in the young the hepatic are obscurely delimited from the branchial and gastric regions and are very slightly tumescent.

Front proper about two-ninths the greatest breadth of the carapace, very faintly notched in the middle line, its free edge longitudinally grooved.

Orbits shallow, their major diameter more than two-thirds the width of the front: borders of orbit finely beaded, the upper border sinuous but entire.

Antero-lateral borders of carapace not much more than half the length of the postero-lateral, well arched, armed with 3 teeth or tubercles (including the outer orbital angle) which become much worn away in adults.

Chelipeds subequal, massive, varying in length with increase in age—from 2 or $2\frac{1}{2}$ times the length of the carapace in females and young males to 4 times and more the length of the carapace in old males, the palm being the principal joint in which the lengthening takes place. There is a spine or tooth in the distal half of the upper surface of the arm, and one at either angle (inner and outer) of the wrist: a blunt crest, ending in a blunt tooth, traverses the inner surface of the palm.

The legs are long: the 3rd pair, which are slightly the longest, are a little more than twice the length of the carapace. The last two joints—as also the anterior border of the carpus—of all the legs are plumose.

In the Indian Museum are 2 specimens from the Gulf of Martaban and the Andaman Sea 53 and 60 fathoms, (besides a large male from Japan).

In spirit the colour is a light reddish ochre, the fingers uncoloured.

6. *Carcinoplax longipes* (Wood-Mason).

Nectopanope longipes, Wood-Mason, Ann. Mag. Nat. Hist., March, 1891, p. 262: Alcock and Anderson, Ill. Zool. Investigator, Crust. pl. xiv. fig. 7.

Carcinoplax longipes, Alcock, Investigator Deep-Sea Brachyura, p. 71.

Carapace, length more than three-quarters its breadth, the regions barely indicated.

Front proper about a third the greatest breadth of the carapace, remarkably prominent, as faintly as possible notched in the middle line.

Orbits shallow, their upper border sinuous but entire, their major diameter about half the width of the front. Eyes small.

Antero-lateral borders of carapace not two-thirds the length of the postero-lateral, moderately arched, armed with two pro-curved spine-like teeth, and with a small blunt denticle just behind the ill-defined orbital angle.

Chelipeds twice the length of the carapace; the arm has a denticle beyond the middle of the upper border, and there is a strong spine—with sometimes a secondary spinule at its base—at the inner angle only of the wrist.

The legs are long and have the dactylus well plumed and the 2 preceding joints more scantily hairy: the third pair, which are slightly the longest, are nearly 2½ times the length of the carapace: though the terminal joints of the fourth (last) pair are compressed they are not so subfoliaceous as those of *C. longimanus*.

In the Indian Museum are 20 specimens from the Andamans 220 to 290 fathoms and off Travancore, 430 fathoms.

In the largest specimen the carapace is 14 millim. long and 17 millim. broad.

In spirit the colour is white with a faint pink tinge, the fingers blackish-brown.

7. PSEUDORHOMBILA, Edw.

Pseudorhombila, Milne Edwards, Hist. Nat. Crust. II. 59, and Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 164.

The only particulars in which *Pseudorhombila* differs from *Carcinoplax* are that the regions of the carapace are better defined, that the square-cut front is more distinctly bilobed, that the supra-orbital border has two distinct sutures, and that the dactyli of the last pair of legs are styliform.

The only specimen in the Indian Museum that is perhaps referable to this genus is too small and too much damaged for description: it is from the Andamans.

LIBYSTES, A. M. Edw.

Libystes, A. Milne Edwards, Ann. Soc. Entom. France, (4) VII. 1867, p. 285, and Nouv. Archiv. du Mus. IV. 1868, p. 84.

This genus unites *Carcinoplax* with *Catoptrus*. It chiefly differs from *Carcinoplax* in having (1) a much shorter and broader carapace, (2) a much shorter and broader buccal cavern, with external maxillipeds that have the antero-external angle of the merus remarkably produced outwards, and (3) the 3rd to 5th abdominal terga of the male fused together. From *Catoptrus* it chiefly differs (1) in having the carapace more subquadrilateral than elliptical, and (2) in the curious *Amphitrite*-like form of the external maxillipeds.

Carapace deepish, subquadrilateral or subelliptical, vastly broader than long, with little or no distinction of regions, convex fore and aft, slightly so from side to side.

The extent of the fronto-orbital border is vastly less than the greatest breadth of the carapace, so that the antero-lateral borders, which may be toothed or entire, have a Cancroid-like curve. Front square-cut and quite straight, not well separated from the supra-orbital angles, slightly notched in the middle line, a third or less the greatest breadth of the carapace.

Orbits shallow, their upper border entire. The basal antenna-joint is short, and the antennal flagellum stands loosely in the orbital hiatus. The antennules fold transversely.

Buccal cavern square-cut, much broader than long; the efferent branchial canals of the palate very well defined. The merus of the external maxillipeds is short and broad and has the external angle much produced, as in many species of *Neptunus*.

Chelipeds subequal, much more massive and longer than the legs; the hands however, which are somewhat tumid, are unequal in the adult.

Legs slender, unarmed: in the Indian species the last pair are almost as paddle-like as those of the typical swimming-crabs of the Portunid family.

In the male the abdomen covers the whole width of the sternum between the last pair of legs, and the 3rd–5th abdominal terga are fused together.

The sternal canals of the male are more perfect than in any other Gonaplacoid known to me.

Key to the Indian species of Libystes.

I. Antero-lateral borders of the carapace serrated almost exactly like those of *Catoptrus nitidus* ... ... *L. Edwardsi.*
II. Antero-lateral borders of the carapace entire ... ... *L. Alphonsi.*

Distribution: Indo-Pacific (Madagascar to Sandwich Is.).

8. *Libystes Edwardsi*, n. sp.

Carapace, length about four-sevenths of the breadth, finely pitted under lens, somewhat granular near the antero-lateral borders: an angular eminence near either posterior angle and a slight concavity of the postero-lateral part of the lateral epibranchial regions give the carapace a somewhat quadrilateral cast.

Front a good deal less than a third the breadth of the carapace, perfectly straight, faintly notched in the middle line. Eyes small.

Antero-lateral borders of the carapace with 5 or 6 granular denticles followed by a sharp procurved spine.

The chelipeds have the hands unequal in the adult. They are more than three times the length of the carapace and are smooth and unarmed. The fingers are slender and hooked at tip, especially in the smaller hand: they are a good deal longer than the palm in the smaller hand, and about as long as the palm in the larger hand. On the immobile finger of the smaller hand there are several irregular enlarged teeth. [In the young, as in *Catoptrus*, the hands are nearly equal, and the fingers of both hands are equally long and slender].

The legs are slender and the longest pair are not much more than twice the length of the carapace. The last 3 joints of the last pair form typical swimming paddles.

An apparently adult specimen from the Persian Gulf and 3 young from the Andamans are in the Indian Museum.

The carapace of the large specimen is 8 millim. long and 14 millim. broad.

9. *Libystes Alphonsi*, n. sp.

Differs from *L. Edwardsi* in the following particulars :—

(1) the carapace, though of the same proportions, is more quadrilateral and more convex fore and aft, and the eminences at the posterior angles are wanting :

(2) the antero-lateral borders of the carapace are smooth and entire :

(3) the front is more deflexed and more distinctly divided in the middle line :

(4) the chelipeds (in the young) are about 2½ times the length of the carapace and are nearly equal and similar: the fingers are hardly as long as the palm :

(5) The last 3 joints of the last pair of legs are much broadened and compressed, but are not such unmistakeable paddles as those of *L. Edwardsi*.

In the Indian Museum is a single specimen from the Andamans: its carapace is 4 millim. long and 7 millim. broad.

This species differs but little, except in the sub-quadrilateral shape of the thorax, from the *Libystes nitidus* described and figured by M. A. Milne-Edwards.

CATOPTRUS, A. M. Edw.

Catoptrus, A. Milne Edwards, Ann. Sci. Nat. Zool. (5) XIII. 1870, p. 82: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 685.

Goniocaphyra, de Man, Archiv fur Naturges. LIII. 1887, i. p. 339.

Carapace transversely elongate-elliptical, without distinction of regions, moderately convex in both directions.

The extent of the fronto-orbital border is vastly less than the greatest breadth of the carapace, the antero-lateral borders, which are serrated, are therefore well curved. Front straight, slightly notched in the middle line, not distinctly separated from the supra-orbital angles, less than a third the greatest breadth of the carapace.

Orbits shallow, their upper border entire. The antennal flagellum, which is of good length, stands in the orbital hiatus. The antennules fold transversely.

Buccal cavern, palate, and external maxillipeds as in *Eucrate*.

Chelipeds much as in *Libystes*. Legs as in *Libystes*, except that the last pair, though they have the dactylus compressed and ciliated, are never paddle-like.

Abdomen as in *Libystes*.

Distribution: Indo-Pacific (Mauritius to Samoa).

Catoptrus really differs from *Libystes* only in the form of the merus of the external maxillipeds and of the last pair of legs, which are not paddle-like as they are in one species of *Libystes*.

10. *Catoptrus nitidus*, A. M. Edw.

Catoptrus nitidus, A. Milne Edwards, Ann. Sci. Nat., Zool., (5) XIII. 1870, p. 82: de Man, Notes Leyden Mus. XII. 1890, p. 67: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 687.

Goniocaphyra truncatifrons, de Man, Archiv fur Nat. LIII. 1887, p. 339, pl. xiv. fig. 1, and Notes Leyden Mus. XII. 1890, p. 67.

Goniocaphyra sp., Zehntner, Rev. Suisse Zool. II. 1894, p. 163, pl. viii. fig. 12, 12*a*.

Carapace, length less than two-thirds its breadth, perfectly smooth and shining except for some fine granulation near the antero-lateral borders.

Front about a third the greatest breadth of the carapace, faintly notched and grooved in the middle line.

Antero-lateral borders cut into five teeth followed by a procurved spine.

Merus of external maxillipeds having the external angle very slightly produced.

Chelipeds unequal, much longer and more massive than the legs, the larger one about three times the length of the carapace: they are smooth and unarmed, except that the anterior border of the arm is finely serrulate and that one of the serrations at either the near or far end (rarely at both) is enlarged to form a spine. In the smaller cheliped the fingers are slender hooked and finely toothed, and are rather longer than the slightly swollen palm: in the larger cheliped they are stouter and more coarsely toothed and are shorter than the swollen palm.

Legs slender, the longest pair are hardly more than twice the length of the carapace; the dactylus of all, though compressed, is slender.

In the Indian Museum are 16 specimens from off Ceylon 34 fathoms (besides 3 from Mauritius and 2 from Samoa).

In the largest specimen (from Mauritius) the carapace is 9·5 millim. long and 14·5 millim. broad. The Indian specimens, though they include egg-laden females, are much smaller.

PSOPHETICUS, Wood-Mason.

Psopheticus, Wood-Mason, Admin. Rep. Marine Survey of India, 1890-91, p. 20 (name only): Alcock, Investigator Deep-Sea Brachyura, p. 72.

Psopheticus in several respects connects *Carcinoplax* and *Pseudorhombila* with *Eucrate*, and hence serves to emphasize the opinion of Miers as to the closeness of the ties that connect the three latter genera.

As in *Pseudorhombila* and *Carcinoplax*, the carapace is much broader than long and the orbital hiatus is open. As in *Pseudorhombila*, the dactylus of the last pair of legs is styliform. As in *Eucrate*, the fronto-orbital border occupies almost all the breadth of the carapace.

Carapace deepish, quadrilateral or subquadrilateral, a good deal broader than long, with the regions hardly defined, moderately convex fore and aft, flat from side to side.

Fronto-orbital border little, if at all, less than the greatest breadth of the carapace, the antero-lateral borders of the carapace therefore—which are short—are either very slightly arched or are in the same straight line with the postero-lateral borders. Front square-cut, straight, prominent, entire, not well delimited from the supra-orbital angles, a third the breadth of the carapace, or a little less.

Upper border of orbit very sinuous and with a single faint short suture line. The antennal flagellum, which is of good length, stands loosely in the orbital hiatus. The antennules fold transversely.

Mouth and external maxillipeds as in *Eucrate*.

Chelipeds much stouter than the legs. The legs end in a slender styliform dactylus, and have one or many spines on the anterior border of the merus.

In both sexes the abdomen consists of seven separate segments, and in the male the third segment covers the whole width of the sternum between the last pair of legs.

Distribution: Andaman Sea.

Key to the (Indian) species of Psopheticus.

I. Carapace quite quadrilateral, the fronto-orbital border being equal to the greatest breadth of the carapace: meropodites of legs with numerous spines ... ... *P. stridulans.*

II. Carapace subquadrilateral, the fronto-orbital border being about three-fourths its greatest breadth: meropodites of legs with a single spine ... ... *P. insignis.*

11. *Psopheticus stridulans*, Wood-Mason.

Psopheticus stridulans, Wood-Mason, Illustrations of the Zoology of the Investigator, Crustacea, pl. v, fig. 1. (1892): Alcock, Ann. Mag. Nat. Hist., May 1894, p. 402; and Investigator Deep-Sea Brachyura, p. 73.

Carapace quite quadrilateral, three-fourths as long as broad, smooth and polished, crossed transversely in its posterior half by a broad groove which is continued obliquely across the pterygostomian regions to the angles of the mouth.

Owing to the large size of the eye and orbit, the extent of the fronto-orbital border is equal to the greatest breadth of the carapace.

A thin sharp prominent tooth at the outer orbital angle, and an obliquely-prominent spine at the junction of the antero-lateral and postero-lateral borders.

The subocular and subhepatic regions are inflated, and together form a granular eminence against which a strong spine on the upper border of the arm can be brought to play, producing a sound. Hence the names *Psopheticus* and *stridulans*.

The major diameter of the reniform eye is between a sixth and a seventh the breadth of the carapace; though the orbit does not conceal the eye its edges are well and cleanly cut.

The chelipeds in the adult male are a little more, in the adult female a little less, than twice the length of the carapace, but are slightly shorter than the legs: they are smooth and polished, as also are the legs. The arm has a strong upstanding claw-like tooth near the middle of its upper border, one or two spinules near the far end of the outer border, and a spinule near the far end of the inner border: the wrist has both the inner and the outer angles spiniform.

The third pair of legs, which are slightly the longest of the four, are rather more than two-and-a-half times the length of the carapace. In all, the anterior edge of the meropodites is armed with spines and the same edge of the carpopodites with spinules—these being least numerous and least distinct in the case of the first pair.

Colours in glycerine: chelipeds and legs rather dusky red; carapace dusky red behind the transverse groove—which forms a very sharply-defined red band—livid red, or almost violet, in front of it; eyestalks almost purple, eyes purplish-black. Eggs in life magenta.

The carapace of the largest male is 15 millim. long and 20 millim. broad.

Only known, so far, from the Andaman Sea: 2 males and a female from 173 fms., 2 males and a female (Types of the species and genus) from 188–220 fms, 7 females (3 with eggs) from 185 fms., a male and 4 females from 370–419 fms.

12. *Psopheticus insignis*, n. sp.

Carapace subquadrilateral, the antero-lateral borders being slightly arched, about three-fourths as long as broad, smooth, crossed transversely by two very low and indistinct ridges—one (convex forwards) between the lateral epibranchial spines, the other at the level of the post-cardiac region. The extent of the fronto-orbital border is about three-fourths the greatest breadth of the carapace.

There is a bluntish tooth at the outer orbital angle, and an obliquely prominent spine at the junction of the antero-lateral and postero-lateral borders, the edge of the carapace between the two being granular.

Eye small, subglobular, its diameter being hardly a tenth the greatest breadth of the carapace.

Chelipeds more than $2\frac{1}{2}$ times as long as the carapace and decidedly longer than the legs: they are unarmed except for a small tooth or spinule at the outer angle of the wrist.

The meropodites of the legs have the anterior border sharply granular, and in the case of the last three pair of legs there is a spine near the far end of this border. The longest pair of legs are hardly $2\frac{1}{3}$ times as long as the carapace.

Two specimens, from the Gulf of Martaban, 60 and 67 fms.

The carapace of the largest is 13 millim. long and 19 millim. broad.

Colours in glycerine, reddish: in the middle of the carapace is a large deep-red shield with a milk-white edge and centre.

This species closely connects *Psopheticus* with *Carcinoplax*.

PILUMNOPLAX, Stimpson restr.

Pilumnoplax, Stimpson, Proc. Ac Nat. Sci. Philad. 1858 (1859) p. 93: Miers, Challenger Brachyura, p. 225: Alcock, Investigator Deep Sea Brachyura, p. 74.

Carapace depressed, flat, a little broader than long, the regions very faintly indicated. Fronto-orbital border two-thirds, or more, the greatest breadth of the carapace: the antero-lateral borders, which are toothed, are slightly arched or oblique. Front square-cut, straight, rather prominent, more or less confluent with the supra-orbital angles, often notched or grooved in the middle line.

Supra-orbital border often with two fissures. The antennal flagellum, which is of good length, stands in the orbital hiatus. The antennules fold transversely, or nearly so.

Mouth and mouth-parts as in *Eucrate*.

Chelipeds either subequal or unequal, much more massive than the legs. Legs slender, their dactyli compressed.

The abdomen in both sexes is seven-jointed: in the male the 3rd segment covers the whole width of the sternum between the last pair of legs.

Distribution: Tropical and S. Atlantic (deep sea), Arabian Sea (deep), Japan, Fiji.

The species of *Pilumnoplax* are characterized by the flat, depressed carapace, which is also comparatively narrow and, owing to the prominence of the perfectly straight front, is subhexagonal in shape.

13. *Pilumnoplax americana*, Rathbun.

Pilumnoplax americanus, Mary J. Rathbun, Bull. Lab. Nat. Hist. Iowa, 1898, p. 283, pl. vii figs. 1, 2.

Pilumnoplax Sinclairi, Alcock, Investigator Deep Sea Brachyura, p. 74, pl. iii. fig. 1.

Carapace subquadrilateral, much depressed, a little more than three-quarters as broad as long, very finely frosted, perfectly bare, the regions fairly indicated.

Front horizontal, slightly prominent, square cut, grooved but not distinctly notched in the middle, more than a third the greatest breadth of the carapace; its free edge is turned vertically downwards and rather deeply grooved from side to side.

The antero-lateral borders are not much more than half the length of the postero-lateral: they are thin and sharp, and are cut into three teeth, of which the first is broad and bicuspid and the other two are acute. On the postero-lateral borders, just behind the junction with the antero-lateral, is a denticle.

The eyes are small but well-formed, and are freely movable. The orbits conceal the retracted eyes to dorsal view: their upper margin is fissured near the middle, and the lower margin is slightly excavated just below the outer angle: the inner angle of the lower margin is not prominent, though dentiform.

The chelipeds in both sexes are very unequal, the larger one being not quite twice as long as the carapace; their surface, under the lens, is finely frosted: the inner angle of the wrist is strongly pronounced and is capped by a pair of acute teeth.

Legs moderately stout, unarmed, smooth, almost hairless: the third pair, which are somewhat the longest, are about two-and-a-half-times the length of the carapace. The dactyli are compressed-styliform.

Colours in spirit french-grey, fingers much darker grey.

A single female specimen, from off the Travancore coast 430 fms., has the carapace 13 millim. long and 16 millim. broad.

This species is closely related to *Pilumnoplax heterochir* (Studer) Miers, but is distinguished from it by the entire and more prominent front, by the absence of transverse markings on the carapace, by the longer legs, and by the smoothness of the chelipeds and legs.

From *Pilumnoplax abyssicola* Miers, which it also closely resembles, it is distinguished by the smooth carapace (to the naked eye), by the turned-down milled edge of the front, by the spinule on the postero-lateral border, by the fissured upper-margin of the orbit, and by the double spine at the inner angle of the wrist.

Distribution: Off Atlantic coasts of North America (Florida and Georgia) 440 and 70 to about 200 fms. Off Travancore coast 430 fms.

A single specimen from the latter locality is in the Indian Museum collection.

[PLATYPILUMNUS, Wood-Mason.

Platypilumnus, Wood-Mason MS., Alcock, Ann. Mag. Nat. Hist., May, 1894, p. 401: Journ. Asiatic Soc. Bengal, Vol. LXVII. pt. 2, 1898, p. 232: Investigator Deep Sea Brachyura, p. 62.

This genus, like so many of the preceding, has strong affinities with the *Xanthidæ*: it may prove to belong to that family, where I have already, with reserve, placed it.

I may here, however, state that it closely resembles *Pilumnoplax*, having a flat, depressed, slightly transverse carapace. It differs from *Pilumnoplax* in the following particulars:—

(1) the front is more prominent, so that the carapace is more decidedly hexagonal:

(2) the fronto-orbital border is sharply serrated and the chelipeds and legs are profusely spiny:

(3) the external maxillipeds do not completely close the buccal cavern, but leave a wide gap between their anterior margin and the edge of the epistome:

(4) the dactyli of the legs are styliform.

Distribution: Andaman Sea.]

[***Platypilumnus gracilipes***, Wood-Mason.

Platypilumnus gracilipes, Wood-Mason MS., Alcock, Ann. Mag. Nat. Hist., May, 1894, p. 401: Ill. Zool. Investigator, Crust., pl. xiv. fig. 6: J.A.S.B. Vol. LXVII, pt. 2, 1898, p. 232: Investigator Deep Sea Brachyura, p. 63.

A description of the female (which is the only sex known) has been already given in this *Journal* (*loc. cit.*)].

LITOCHIRA, Kinahan.

Litochira, Kinahan, Journ. Roy. Soc. Dublin, I. 1858, p. 121: Miers, Challenger Brachyura, p. 231.

? *Brachygrapsus*, Kingsley, Proc. Ac. Nat. Sci. Philad. 1880 (1881) p. 203.

Carapace and appendages in all the Indian species thickly tomentose and hairy.

Carapace deepish, either subquadrilateral and a good deal broader than long, or almost square, smooth, with little or no distinction of regions, flat, but declivous anteriorly. Fronto-orbital border not much less than, if not equal to, the greatest breadth of the carapace: antero-lateral borders short and if arched at all, very slightly so, and usually, but not always, with 2 or 3 teeth or spines.

Front not well delimited from the supra-orbital angles, its free edge deflexed and somewhat arched, never square-cut and laminar; more or less distinctly bilobed.

Upper border of orbit entire. The antennal flagellum, which is of good length, stands in the orbital hiatus. The antennules fold transversely, or nearly so.

Mouth and external maxillipeds as in *Eucrate*, &c.

Chelipeds subequal, more massive and usually shorter than the legs. The legs, including the dactyli, are compressed.

The abdomen of the male occupies the whole width of the sternum between the last pair of legs: in both sexes it consists of 7 segments.

I restrict the genus *Litochira* to those species which have the edge of the front turned down and distinctly arched as is shown in Kinahan's figure. These species fall into two groups, in one of which the carapace is a good deal broader than long, as in Kinahan's type, while in the other it is nearly square. Perhaps these two groups should be separated, though I do not recommend this course.

Distribution: S. Atlantic and Indo-Pacific (Cape to Australia).

Key to the Indian species of Litochira.

I. Length of carapace about two-thirds the greatest breadth of the carapace and equal to the extent of the fronto-orbital border; the antero-lateral borders distinctly arched :—
   1. Antero-lateral borders of the carapace with three truncated teeth, exclusive of the orbital angle .. *L. angustifrons.*
   2. Antero-lateral borders with two distinct, though blunt, teeth .... *L. setosa.*
   3. Antero-lateral borders with hardly any trace of lobulation—almost entire .... *L. integra.*

II. Carapace more nearly square, the fronto-orbital border almost equal to its greatest breadth, so that the antero-lateral borders are almost in the same straight line with the postero-lateral borders or a very little curved :—
   1. Antero-lateral borders with two spines and one at the orbital angle : legs unarmed .... *L. Beaumontii.*
   2. Antero-lateral borders with two spines : no spine at the orbital angle : meropodites of the legs with some spines .... *L. quadrispinosa.*

14. *Litochira integra* (Miers).

Carcinoplax integra, Miers, Zool. H. M. S. Alert, p. 543, pl. xlviii. fig. C: de Man, Journ. Linn. Soc., Zool., XXII, 1887-88, p. 93.

Length of the carapace about two-thirds its breadth and equal to the extent of the fronto-orbital border.

Antero-lateral borders arched, without spines, though when completely denuded they are granular and show faint but quite distinguishable traces of division into two lobules besides the orbital angle.

Chelipeds less than twice the length of the carapace and shorter than the legs, unarmed except for an indistinct blunt tooth near the far end of the upper border of the arm: inner angle of wrist dentiform. Legs unarmed.

A single female from Mergui: its carapace is 6 millim. long and 9 millim. broad.

15. *Litochira setosa* (A. M. Edw.).

Carcinoplax setosa, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 267, pl. xii. fig. 2: de Man, Archiv f. Naturges. LIII. 1887, i. p. 349, and Journ. Linn. Soc., Zool., XXII. 1887–88, p. 93.

The only essential difference between this species and the preceding is that the carapace here is a little more depressed and that the antero-lateral borders are cut into 2 blunt teeth besides the blunt orbital angle. The size is about the same.

In the Indian Museum are 16 specimens, from the Andamans and Mergui.

16. *Litochira angustifrons*, n. sp.

Carapace, length a little more than two-thirds the breadth. Fronto-orbital border nearly five-ninths the breadth of the carapace in extent. Antero-lateral borders arched, cut into 4 teeth (including the outer orbital angle) the edges and dorsal surface of which are granular: the first 3 teeth are sharply truncated, the fourth is subacute.

Chelipeds, in the adult male, nearly twice the length of the carapace and hardly shorter than the legs; in the female much less than twice the length of the carapace and markedly shorter than the legs. There is a lobule near the far end of the upper border of the arm, and the inner angle of the wrist is subacute.

Two specimens, from Bombay and Karachi. The carapace of the larger is 13 millim. long and 18 millim. broad.

This species appears to be closely related to *Pilumnoplax ciliatus* Stimpson.

17. *Litochira Beaumontii*, n. sp.

Carapace, length more than two-thirds the greatest breadth, nearly square. The extent of the fronto-orbital border is hardly less than the breadth of the carapace. The antero-lateral borders are hardly arched and are armed with 3 sharp spinules—including one at the outer orbital angle.

The chelipeds are much shorter than the legs and, like them, are unarmed, except that the inner angle of the wrist is dentiform. The longest (penultimate) pair of legs are more than $2\frac{1}{2}$ times as long as the carapace.

In the Indian Museum are 4 specimens, from the Andamans and from off Ceylon 34 fms. The carapace of the type specimen is 5 millim. long and 7 millim. broad.

Colour in spirit, uniform yellow.

18. *Litochira quadrispinosa*, Zehntner.

Litochira quadrispinosa, Zehntner, Rev. Suisse de Zool. II. 1894, p. 171, pl viii. figs. 11, 11*b*.

Differs from *L. Beaumontii* in the following particulars only :—

(1) the carapace is still more nearly square :

(2) there are 2 spines on the antero-lateral borders but none at the outer orbital angles :

(3) the inner border of the ischium and arm of the chelipeds is serrated, and the meropodites of the legs are armed with spines.

(4) the colouration is yellow, with a large purplish-brown horseshoe behind the front, and with sinuous markings of the same colour on the lateral subfrontal and suborbital regions of the carapace : the greater part of the antennal flagella is of the same purplish-brown colour.

In the Indian Museum is a single specimen from the Andamans : the carapace is 4 millim. long and 5 millim. broad.

Subfamily ii. GONOPLACINÆ.

19. GONOPLAX, Leach.

Gonoplax, Leach, Trans. Linn. Soc. XI. 1815, pp. 309, 323, and Malac. Pod. Brit. : Desmarest, Consid. Gen. Crust. p. 124, and Dict. Sci. Nat. XXVIII. p. 243 : De Haan, Faun. Japon. Crust., p. 19 : Milne Edwards, Hist. Nat. Crust. II. 60, and Ann. Sci. Nat. Zool. (3) XVIII. 1852, p. 162 : Dana, U. S. Expl. Exp. Crust. pt. I. p. 310 : Bell, Brit. Stalk-eyed Crust. p. 129 : Heller, Crust. Sudl. Europ. p. 102 : Miers, Challenger Brachyura, p. 245.

Rhombilia, Lamarck (part), Hist. Nat. Anim. sans Vert. (2) V. p. 466 : Latreille, Encyc. Méthod. X. p. 292.

Carapace subquadrilateral, with the antero-lateral angles acute and the lateral borders posteriorly convergent, a good deal broader than long, moderately convex, the regions but faintly indicated.

The front and orbits occupy the whole anterior border of the carapace : the front is square cut, laminar, and obliquely deflexed, and takes up between a third and a fourth of the anterior border of the carapace, the rest being taken up by the trench-like orbits.

Eyestalks long and slender : the antennules fold quite transversely beneath the front : the antennæ have a short basal joint and a slender flagellum of good length, standing in the orbital hiatus.

The buccal cavern is square and is well separated from the prominent epistome: the efferent branchial channels are not well defined. The external maxillipeds completely close the buccal cavern: their merus is square and carries the flagellum at the antero-internal angle.

Chelipeds in both sexes much more massive, and in the male very much longer, than the legs, which are long and slender.

The abdomen in both sexes consists of 7 separate segments: in the male the 3rd segment nearly but not quite covers the sternum between the last pair of legs.

Distribution: North-Eastern Atlantic coasts, Mediterranean basin; Persian Gulf; East Indian Archipelago.

In the Indian Museum there is a young female, lately received by myself from the Persian Gulf, of a species of *Gonoplax.* Apart from the shortness of the chelipeds it differs from *G. angulata*, of which we have several good specimens from Europe, only in wanting the terminal spine to the upper border of the meropodites of the legs.

Subfamilies iii. & iv. RHIZOPINÆ & HEXAPODINÆ.

Key to the Indian Genera.

A. Four pairs of legs, besides the chelipeds (*Rhizopinæ*):—
  I. The antennulary flagella can be completely retracted within the antennulary fossæ:—
    1. The epistome is of good length fore and aft, it is not in any way confused with the palate but is commonly prominent and almost vertical:—
      i. Eyes well formed, rarely deficient in pigment:—
        a. Eyes in all respects perfect: front straight, entire, from two-fifths to half the greatest breadth of the carapace: merus of the external maxillipeds nearly square...... NOTONYX.
        b. Eyes either quite perfect or deficient in pigment: front slightly curved and notched in the middle, about a third the greatest breadth of the carapace: antero-external angle of the merus of the external maxillipeds much produced... CERATOPLAX.
      ii. Eyes obsolete or nearly so:—
        a. Carapace much broader than long, the postero-lateral borders parallel ... . TYPHLOCARCINUS.
        b. Carapace a little broader than long, the postero-lateral borders anteriorly-convergent .... XENOPHTHALMODES.

2. The epistome is short, sunken, and not boldly separated from the palate :—
    - i. Eyes minute, orbits concealed beneath the anterior border of the carapace : merus of external maxillipeds with a sharp antero-external angle ... ... SCALOPIDIA.
    - ii. Eyes obsolete or nearly so, orbits visible from above : antero-external angle of merus of external maxillipeds rounded off ... ... TYPHLOCARCINODES.

II. The basal joint of the antennules completely fills its fossa, into which the flagellum cannot therefore be retracted :—

1. Eyes small, but perfect : outer border of merus of external maxillipeds almost straight ... ... HEPHTHOPELTA.
2. Eyes reduced to a speck of pigment : outer border of merus of external maxillipeds with a strongly convex bulge outwards ... ... CAMATOPSIS.

B. Only three pairs of legs besides the chelipeds, the last pair of other crabs not being represented even by a rudiment. The *vasa efferentia* of the male open on the 4th sternal segment (*Hexapodinæ*) ... ... LAMBDOPHALLUS.

Subfamily iii. RHIZOPINÆ, Stimps.

NOTONYX, A. M. Edw.

Notonyx, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 268 :- Miers, Challenger Brachyura, p. 235.

Carapace deepish, subquadrilateral with the antero-lateral angles rounded off, broader than long, perfectly nude smooth and polished, without any indication of regions, convex fore and aft and anteriorly declivous.

Fronto-orbital border a good deal more than three-fourths the greatest breadth of the carapace : antero-lateral borders short, entire, curved. Front straight, sublaminar, from two-fifths to half the breadth of the carapace.

Eyes small but well developed, the eyestalks movable, obpiriform : orbits in the usual marginal position. The antennules fold transversely in well formed pits. Basal antenna-joint short ; the flagellum, which is of fair length, stands in the orbital hiatus.

Epistome well formed, nearly vertical : buccal cavern a little wider in front than behind. A slight hiatus between the external maxillipeds, the merus of which appendages is square and carries the flagellum at the antero-internal angle.

Chelipeds subequal, or a little unequal, smooth and polished, much more massive and but little shorter than the legs: palm short and rather deep, with the lower border sharply carinate.

Legs smooth, unarmed, with a very few scattered lank hairs: dactyli styliform.

The abdomen in both sexes consists of 7 separate segments and does not nearly conceal the sternum between the last pair of legs.

Distribution: Indo-Pacific, from Fiji to the Persian Gulf.

Key to the Indian species of Notonyx.

I. Carapace, length about three-fourths the breadth: merus of external maxillipeds about as long as the ischium ... *N. nitidus.*

II. Carapace, length about five-sixths the breadth: merus of external maxillipeds much shorter than the ischium ... *N. vitreus.*

20. *Notonyx nitidus*, A. M. Edw.

Notonyx nitidus, A. Milne Edwards, Nouv. Archiv. du Mus. IX, 1873, p. 269, pl. xii. fig. 3: Miers, Challenger Brachyura, p. 236.

Carapace, length a little more than three-fourths the greatest breadth. Front between a third and two-fifths the breadth of the carapace. Orbits elongate. Merus of the external maxillipeds as long as the ischium.

A small denticle near the far end of the upper border of the arm: inner angle of wrist pronounced, but not acute.

Legs with some scattered hairs along the edges, the 3rd pair, which are slightly the longest, are about 2½ times the length of the carapace and nearly half again as long as the chelipeds.

In the Indian Museum is a single specimen from the Persian Gulf: its carapace is 8·5 millim. long and 11 millim. broad.

21. *Notonyx vitreus*, n. sp.

Carapace, length about five-sixths the greatest breadth, rather tumid. Front nearly half the breadth of the carapace. Merus of the external maxillipeds shorter than the ischium.

No denticle on the arm: inner angle of wrist blunt. Legs with hardly any hairs, otherwise resembling those of *N. nitidus.*

In the Indian Museum is a single specimen from the Andaman Sea, 53 fathoms: its carapace is 5 millim. long and 6 millim. broad.

CERATOPLAX, Stimpson.

Ceratoplax, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 96: Miers, Challenger Brachyura, p. 233.

Carapace deep, subquadrilateral with the antero-lateral angles rounded off, a good deal broader than long, the regions very indistinctly and incompletely indicated, strongly convex fore and aft and anteriorly declivous.

Fronto-orbital border about two-thirds the greatest breadth of the carapace: antero-lateral borders sharp, entire, curved: postero-lateral borders parallel.

Front about a third the greatest breadth of the carapace, its free edge slightly arched, notched in the middle line.

The orbits are in the usual position and the eyestalks are immovably fixed in them, but the eyes are fairly well formed, though they may be deficient in pigment. The antennules fold transversely in proper pits. The basal antenna-joint is short: the flagellum, which is of good length, stands in the orbital hiatus.

Epistome well formed and prominent: buccal cavern quadrilateral, slightly increasing in breadth from behind forwards, almost completely closed by the external maxillipeds, the merus of which has *the antero-external angle much produced* and carries the flagellum at the antero-internal angle.

Chelipeds subequal, more massive but decidedly shorter than the legs; the palm short, deep, and compressed.

Legs slender, unarmed, the 3rd pair the longest: dactyli styliform.

The abdomen in both sexes consists of 7 separate segments and does not nearly occupy the space between the last pair of legs.

Distribution: Indo-Pacific from the Bay of Bengal to Ecuador.

Key to the Indian species of Ceratoplax.

I. Surface of carapace nude, eyes well pigmented: outer surface of palm polished and nearly smooth ... ... *C. ciliata.*

II. Surface of carapace tomentose, eyes deficient in pigment: rows of vesiculous granules on the outer surface of the palm ... ... *C. hispida.*

22. *Ceratoplax ciliata*, Stimpson.

Ceratoplax ciliatus, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 96: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1890, p. 110.

Ceratoplax ciliata, Miers, Challenger Brachyura, p. 234, pl. xix. fig. 3: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 229.

Carapace, chelipeds and legs rather scantily fringed with hairs, but with a nude surface.

Carapace, length a little more than three-fourths the greatest breadth, sparsely punctate, the regions not distinguishable. Front about a third the greatest breadth of the carapace, its free edge slightly arched and notched in the middle line. Eyes well pigmented. Chelipeds decidedly shorter than the legs: inner angle of wrist sharp, but not produced: outer surface of palm smooth and polished, except for a few depressed granules inferiorly. Third pair of legs not twice the length of the carapace.

In the Indian Museum is a single specimen from the Andaman Sea, 53 fms.

23. *Ceratoplax hispida*, n. sp.

Carapace, chelipeds and legs with a tomentose surface, and fringed with longer silky hairs.

Carapace, length a little less than three-fourths the breadth, when denuded its regions (and three gastric subregions) are just distinguishable, and its surface is pitted and its lateral margins granular. Front a little more than a third the greatest breadth of the carapace, its free edge decidedly arched and notched in the middle line. Eyes very deficient in pigment. Chelipeds (in the female—male unknown) much shorter than the legs: inner angle of wrist sharply dentiform; outer surface of palm with numerous rows of vesiculous granules. Third pair of legs two-and-a-half times the length of the carapace.

In the Indian Museum is a single specimen from Palk Straits: its carapace is 9 millim. long and 13 millim. broad.

TYPHLOCARCINUS, Stimpson.

Typhlocarcinus, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 95.

Carapace as in *Ceratoplax*. Fronto-orbital border about half the greatest breadth of the carapace. Front less than a fourth the breadth of the carapace, more or less distinctly bilobed. Antero-lateral borders well curved, often emarginate in places: postero-lateral borders parallel.

Orbits in the usual position, completely filled by the immovable eye-stalks: eyes obsolete, or nearly so. The antennules fold nearly transversely, in proper pits. Basal antenna-joint short; the flagellum, which is short, stands in the orbital hiatus.

Epistome well formed and prominent: buccal cavern completely, or almost completely, closed by the external maxillipeds, the flagellum of which articulates with the antero-internal angle of the merus; the outer angle of the merus not produced.

Chelipeds subequal or unequal, much more massive than the legs from which they do not much differ in length: palm short deep and compressed, with sharp upper and lower borders.

Legs slender, unarmed, the 3rd pair slightly the longest: dactyli styliform.

The abdomen in both sexes consists of 7 separate segments and does not nearly occupy all the sternum between the last pair of legs.

Distribution: Indo-Pacific, from the Persian Gulf to Hongkong.

From *Rhizopa*, of which we possess specimens from Hongkong, this genus differs only in having the eyes obsolete and the external maxillipeds more closely opposed to each other. It may well be doubted whether these differences are of generic value.

Key to the Indian species of Typhlocarcinus.

- I. Antero-lateral borders with 2 or 3 emarginations:—
  - 1. Buccal cavern decreasing in size from behind forwards: antero-external angle of merus of external maxillipeds obsolete and rounded off ... ... *T. nudus.*
  - 2. Buccal cavern quite square: antero-external angle of merus of external maxillipeds sharp ... ... *T. villosus.*
- II. Antero-lateral borders of carapace entire: buccal cavern quite square ... ... *T. rubidus.*

24. *Typhlocarcinus nudus*, Stimpson.

Typhlocarcinus nudus, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 96.

Carapace much transverse, its length only about five-eighths its greatest breadth, its surface smooth and bare, the regions hardly distinguishable. The posterior part of the antero-lateral border has two or three obscure notches.

The front, which is about a fifth the greatest breadth of the carapace, is grooved in the middle line—almost bilobed. Orbits broadly oval, almost subcircular.

Buccal cavern considerably decreasing in breadth from behind forwards: merus of the external maxillipeds with the antero-external angle obsolete and rounded off; the exognath very narrow.

Chelipeds and legs smooth, with only a few scant hairs on the margin. Chelipeds, in the male about twice the length of the carapace, a little longer than any of the legs: inner angle of wrist sharp, but not produced: palms unequal, smooth and polished, the upper border smooth and crest-like, the lower border with a distinct moulding.

In the Indian Museum are 25 specimens, from Karachi and the Mekrán coast, Madras coast and Sandheads, and the Andamans.

In this species a tiny speck of pigment denotes an eye.

25. *Typhlocarcinus villosus*, Stimpson.

Typhlocarcinus villosus, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 96 Miers, P. Z. S., 1879, pp. 20, 40: Walker, Journ. Linn. Soc. Zool. XX. 1890, p. 110, pl. ix. figs. 6–8: Ortmann, Zool. Jahrb. Syst. VII. 1893–94, p. 689.

Carapace and appendages everywhere covered with velvet. Carapace about three-fourths as long as broad, its greatest breadth across the middle: when denuded it is granular in places and the regions are hardly distinguishable. Three blunt granular teeth on the lateral borders, two of which are antero-lateral, the third being postero-lateral.

Front between a fourth and a fifth the breadth of the carapace, bilobed: orbits piriform.

Buccal cavern quite square: antero-external angle of merus of external maxillipeds well marked but not produced, the exognath normal.

Chelipeds about twice as long as the carapace, and nearly the same length as the 3rd (longest) pair of legs, their outer surface, especially that of the palm, is granular: inner angle of the wrist produced, dentiform. The legs are fringed with coarsish hairs.

In the Indian Museum, besides a specimen from Hongkong, are 6 from various parts of the coast of the Bay of Bengal.

The carapace of the best specimen is 6 millim. long and 8 millim. broad.

In this species also there is a tiny speck of pigment for an eye.

26. *Typhlocarcinus rubidus*, n. sp.

Carapace perfectly smooth and nude, except for a few hairs on the anterior and antero-lateral margins, its length a little over three-fifths its breadth, the regions hardly distinguishable, though the epibranchial regions have a decided dorsal bulge.

The antero-lateral borders, which, like the postero-lateral are blunt and granular, are quite entire.

Front about a fifth the breadth of the carapace, bilobed, the median groove very deep. Orbits piriform. Buccal cavern and external maxillipeds as in *T. villosus.*

Chelipeds and legs rather hairy, but there is always a large smooth bare space on the outer surface of the wrist and palm. Chelipeds about as long as the longest legs, less than twice the length of the carapace: inner angle of wrist produced, dentiform: below and above the bare patch on the wrist and hand the surface, when denuded, is granular.

The colour is a rich ruddy brown.

In the Indian Museum are 18 specimens from the Bay of Bengal, 20 to 65 fms.

The largest specimen has the carapace nearly 7 millim. long and 10 millim. broad, but there are egg-laden females smaller than this.

There is no pigment speck to represent an eye in this species.

XENOPHTHALMODES, Richters.

Xenophthalmodes, Richters, in Möbius Meeresf. Maurit. p. 155, 1880.

Carapace rudely semicircular in outline, the posterior border being the longest, and the postero-lateral borders being anteriorly-convergent to form a common curve with the well-arched anterior and antero-lateral borders: it is but little broader than long, is convex fore and aft and strongly declivous anteriorly, and shows the regions indistinctly and incompletely.

Fronto-orbital border less than half, front less than a fifth, the greatest breadth of the carapace, the front being prominent and bilobed.

Orbits in the usual position, completely filled by the immovable eye-stalks: eyes obsolete. The antennules are small, and fold obliquely rather than transversely in proper pits. Basal antenna-joint short: the flagellum, which also is short, stands in the orbital hiatus.

Epistome and mouth parts, as also the abdomen, as in *Typhlocarcinus.*

Chelipeds a little unequal, much more massive and rather longer than the legs, of which the 3rd pair is slightly the longest. Palm short deep and compressed, with sharp edges.

Legs slender, unarmed: dactyli styliform.

Distribution: Indian Ocean, from Mauritius and the Red Sea to the Andamans.

This genus differs from *Typhlocarcinus* in having the carapace more elongate and more semicircular in outline, the front more prominent and narrower, and the antennules more cramped in consequence.

27. *Xenopthalmodes moebii*, Richters.

Xenophthalmodes moebii, Richters, in Möbius, Meeresf. Maurit. p. 155, pl. xvi. fig. 29 and pl. xvii. figs. 1–5 1880: Miers, P. Z. S. 1884, pp. 10, 12: de Man, Notes Leyden Mus. XII. 1890, p. 68, pl. iii. fig. 5.

The carapace has rather a lop-sided look and is practically smooth, except for two rather deep semilunar impressions that incompletely separate the gastro-cardiac from the epibranchial regions: its surface is bare, but its free edges, like the edges of the chelipeds and legs, are thickly fringed with longish silky hairs: its length is about five-sixths the greatest breadth, which is quite posterior. Front very decidedly bilobed. Orbits oval. Buccal cavern very slightly decreasing in breadth anteriorly: the merus of the external maxillipeds has the antero-external angle rounded off.

Chelipeds in the male a little longer than the legs, and with the hands decidedly unequal: the inner angle of the wrist is acuminate: the upper edge of the palm is sharp and crest-like, the lower edge has a low granular crest or moulding, the surface of the palm is smooth and polished. The larger cheliped, measured along its convexities, is about twice the length of the carapace.

In the Indian Museum are 13 specimens, from the Persian Gulf, Malabar coast, Coromandel coast, Gulf of Martaban, and the Andamans. The carapace of the largest specimen is 10 millim. long and 12 millim. broad.

In one very young specimen the eye is represented by a tiny speck of pigment, as shown in de Man's figure, but in large specimens there is no trace of this speck.

SCALOPIDIA, Stimpson.

Scalopidia, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 95: Miers, Challenger Brachyura p. 223.

Hypophthalmus, Richters, Abh. Senck. Nat. Ges. Frankfurt, XII. 1881, p. 429.

Carapace of but moderate depth, moderately convex fore and aft and but moderately declivous anteriorly: it is a good deal broader than long and inclines somewhat to a semicircular outline, the greatest breadth being quite posterior, the postero-lateral borders being anteriorly convergent, and the antero-lateral borders being nicely curved: the regions are distinctly mapped out by fine grooves.

Fronto-orbital border about two-fifths, front about a fourth the greatest breadth of the carapace: front rather obscurely bilobed, antero-lateral borders acute.

Eyes minute, eyestalks fixed in small orbits which lie entirely beneath the anterior border of the carapace. The antennules fold transversely in shallow and rather inadequate pits. Basal antenna-joint short; the flagellum, which is of moderate length, stands quite clear of the orbital hiatus.

Epistome sunken, not well demarcated from the edge of the buccal cavern: the latter is squarish and broader in front than behind. There is a considerable gap between the external maxillipeds, the merus of which is square and has a sharp antero-external angle and carries the flagellum at the antero-internal angle.

Chelipeds a little unequal, much shorter and not much more massive (except as regards the larger palm) than the third pair of legs: palm short and compressed, with sharp edges.

The legs have the merus broadened, especially in the case of the 2nd and 3rd pair: the 3rd pair is considerably the longest.

The abdomen consists of 7 separate segments, and does not nearly occupy all the sternum between the last pair of legs.

Distribution: Indo-Pacific, from Madagascar to China.

28. *Scalopidia spinosipes*, Stimpson.

Scalopidia spinosipes, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 95: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 379.

Carapace and appendages downy. Carapace, length about two-thirds the greatest breadth, its surface closely punctate: all the regions are quite plainly defined by grooves, which also subdivide the gastric into three subregions, and the epibranchial into two—an anterior and a posterior; and the cardiac region has a distinct bulge. The sharp-cut antero-lateral borders are, like the anterior border, very finely serrated, and are marked off from the blunt postero-lateral borders by a minute spine.

The larger cheliped is barely half again as long as the carapace: both chelipeds have the lower edge of the arm finely serrated, have a spinule near the far end of the upper border of the arm and one at the outer angle of the wrist, and have the inner angle of the wrist strongly dentiform.

The legs have their edges, except in the case of the dactyli, closely and evenly spinulate, but there is a tendency for the spines to fail on the posterior edge of the carpus and propodite. The 3rd pair, which are considerably the longest, are much more than $2\frac{1}{2}$ times the length of the carapace. The legs increase remarkably in length from the 1st to the 3rd, and the 4th are about the same length as the first. The dactyli are sharp, strong, styliform and ciliated: those of the last pair are curved, those of the other pairs are straight.

Henderson records this species from the Gulf of Martaban: the only specimens in the Indian Museum are from Hongkong.

29. TYPHLOCARCINODES, n. gen.

Apparently one of the links between *Typhlocarcinus* and its allies on the one hand and *Scalopidia* on the other.

Carapace moderately deep, shaped much as in *Typhlocarcinus*, but slightly more elongate, the free edges hairy. Fronto-orbital border about three-fifths, front about a third, the greatest breadth of the carapace: front prominent, its free edge convex and entire.

Orbits in the normal position, narrow, button-hole shaped; eye-stalks tapering, immovable; eyes obsolete or nearly so. *Antennules cramped, folding very obliquely—nearly longitudinally*—in proper pits. Antennal penduncle small and cramped, the flagellum standing in the orbital hiatus.

Epistome sunken, linear: buccal cavern square, its anterior angles, like the antero-external angles of the merus of the external maxillipeds, rounded off: the external maxillipeds completely close the buccal cavern and have the flagellum articulated to the antero-internal angle of the merus.

The abdomen does not nearly occupy all the space between the last pair of legs.

The above diagnosis is framed on a broken specimen, without chelipeds or legs, in the Indian Museum. In the form of the front and shape of the carapace this specimen has a strong resemblance to the *Typhlocarcinus integrifrons* described and figured by Miers in Ann. Mag. Nat. Hist. (5) VIII. 1881, p. 260, pl. xiv. fig. 1. Miers himself was doubtful about referring his species to *Typhlocarcinus.*

Our specimen is too much damaged to furnish a useful specific diagnosis.

HEPHTHOPELTA, Alcock.

Hephthopelta, Alcock, Investigator Deep Sea Brachyura, p. 76.

Carapace very deep, inflated, rudely semicircular, about as long as broad, convex fore and aft and vertically deflexed anteriorly, all its borders entire and all, except the posterior, tumid, the cardiac and branchial regions well delimited.

Front considerably less than a third the greatest breadth of the carapace, bilobed, vertically deflexed; the whole extent of the fronto-orbital border is more than half the greatest breadth of the carapace.

Orbits small, shallow, excavated in the vertically-deflexed anterior border of the carapace, not concealing the eyes. Though the eyes are small and their stalks immovably fixed, they are *well formed, well defined and well pigmented.*

The antennulary fossæ are completely filled by the basal antennulary joint, to the exclusion of the flagella.

The basal antenna-joint is small, slender, and does not nearly reach the front; the flagellum, which arises in the orbital hiatus, is hardly longer than the orbit.

The epistome is of considerable width fore and aft and, though sunken, is well defined from the palate. The buccal cavern is square, though very slightly narrower in front than behind: the excurrent branchial canals are well defined. The external maxillipeds, which completely cover the buccal cavern, have the merus shorter and slightly narrower than the ischium and somewhat oval in shape, and the palp jointed to the antero-internal angle of the merus and of good size.

The legs are all long and slender and end in a slender dactylus: the third pair are slightly the longest.

The chelipeds are lost in the single specimen obtained, which is a female.

30. *Hephthopelta lugubris*, Alcock.

Hephthopelta lugubris, Alcock, Investigator Deep Sea Brachyura, p. 77. pl. iv, fig. 2.

Carapace as long as broad, roughly semicircular or semiglobose, of thin texture, its surface very finely frosted and somewhat pubescent.

The fronto-orbital region is vertically deflexed and almost invisible in a dorsal view.

Epibranchial and cardiac regions tumid, circumscribed by deepish grooves.

Legs subcylindrical, with a finely frosted and pubescent surface: the third pair, which are slightly the longest, are about 2¾ times the length of the carapace: the posterior (lower) border of the merus of the first two pairs is spinulose.

Colours in spirit, light yellow, eyes black.

A single female, without chelipeds, from the Andaman Sea, 490 fms. The carapace is 8 millim. long, and the same in breadth.

CAMATOPSIS, Alcock.

Camatopsis, Alcock, Investigator Deep Sea Brachyura, p. 75.

Carapace deep, rudely sub-semicircular, hardly broader than long, strongly convex fore and aft and declivous anteriorly: its antero-lateral borders short sharp and entire, its postero-lateral borders long sharpish and slightly convergent anteriorly: its only markings are two longitudinal grooves hardly visible on the undenuded carapace, that mark off the epibranchial regions.

Front considerably less than a fourth the greatest breadth of the carapace, obscurely bilobed; the whole fronto-orbital border is about half the greatest breadth of the carapace.

Orbits large, deep, and normally cut in the anterior border of the carapace: eyestalks large, tumid, conical, almost immovably fixed in the orbits: eyes reduced to a speck of pigment placed on the under surface of the tip of their stalks.

Antennulary fossæ small, and filled entirely by the basal antennulary joint, *to the complete exclusion of the large flagellum.*

The small basal antenna-joint is wedged in between and beneath the eyestalk and antennule, the second joint hardly reaches to the front, the flagellum is large and considerably longer than the orbit.

The epistome is of considerable width fore and aft, especially at its middle, and though sunken, is well separated from the palate. The buccal cavern is square, though rather broader in front than behind, and is almost entirely covered by the external maxillipeds. These have the *merus as long as, and markedly broader than the ischium, owing to the strongly convex bulge of the outer border of the merus:* the palp, which is of good size, is jointed to the antero-internal angle of the merus.

The chelipeds are moderately massive and in the male the hands are unequal. The arm is short and trigonal, the wrist rather long narrow and crooked.

Legs sufficiently long and stout, the penultimate pair being the longest; their dactyli are sharply trigonal and elegantly plumose: the last pair have the dactylus slightly curved and compressed.

The abdomen of the male, which is four-jointed, does not nearly fill the space between the last pair of legs.

Between the 4th and 5th segments of the sternum, in the male, is intercalated a long narrow plate that covers the external genital ducts.

31. *Camatopsis rubida*, Alcock and Anderson.

Camatopsis rubida, Alcock and Anderson, Ann. Mag. Nat. Hist. Jan. 1899, p. 13: Alcock, Investigator Deep Sea Brachyura, p. 76, pl. iv. fig. 3.

Carapace very finely granular when denuded of the short velvet that covers it and all parts of the body and appendages. The narrow front and the antero-lateral borders form a semicircular curve: the postero-lateral borders are anteriorly convergent, the greatest breadth of the carapace being between the bases of the penultimate pair of legs. The tumid anterior (true inner) borders of the eyestalks bulge beyond the orbital concavities of the anterior border of the carapace.

The efferent branchial canals cause an angular bulging or carination of the pterygostomian regions.

The chelipeds are unequal in the male (female unknown), the longer one being about $1\frac{3}{4}$ times the length of the carapace. They are unarmed. In the larger hand the fingers meet only at tip and are finely toothed in the distal half only, being rather deeply notched in the basal half, while on the inner surface of the movable finger is a curious truncated spine. In the smaller hand the fingers meet throughout their extent and only the immovable finger is distinctly toothed, one or two of its teeth being enlarged.

The first and last pair of legs are about $1\frac{2}{3}$ times, the second and third pair are about twice, the length of the carapace. In the last pair of legs the terminal joints are more strongly ciliated, and the dactylus is slightly curved and compressed as for swimming.

Colours in spirit rich chocolate brown. Animal entirely covered with velvet.

Three males from the Andaman Sea, 194 fathoms. The carapace of the largest is 9 millim. long and 10 millim. broad.

Subfamily iv. HEXAPODINÆ, Miers.

LAMBDOPHALLUS, nov. gen.

Near *Hexapus*, De Haan, from which it chiefly differs in the form of the anterior pair of male sexual appendages, which are rigidly bent into the form of an **L**, the horizontal limb of which is lodged in a special trench in the first segment of the sternum.

Carapace much broader than long, broadest behind. Front narrow, nearly vertically deflexed. Orbits small, circular, widely communicating with the antennular fossæ. The antennules fold transversely. Antennæ small, standing in the orbital hiatus.

Epistome well-defined. Buccal cavern with the sides slightly convergent anteriorly. The external maxillipeds have coarse palps, which, when folded, fill the rather broad space that exists between the ischiopodites: the merus is subquadrilateral, with the antero-external angle rounded off, and the palp articulates with its antero-internal angle: the exognath is not concealed.

Chelipeds unequal in the male, shorter but more massive than the legs.

Only three pairs of legs, the fourth pair entirely absent.

Sternum extremely broad. Abdomen of the male very narrow. The efferent ducts of the male sex open on the 4th sternal segment inside the fossa into which the abdomen fits.

32. *Lambdophallus sexpes*, n. sp.

Resembles *Hexapus sexpus*, De Haan, with a specimen of which I have compared it, but differs in numerous important characters.

Carapace subquadrilateral with the anterior angles broadly rounded off, much broader than long, convex fore and aft and anteriorly deflexed, nearly flat from side to side, the gastric and cardiac regions well defined, the surface uniformly finely granular under a lens.

Front nearly vertically deflexed, its edge square-cut but grooved or notched in the middle line, its breadth about a fifth the greatest breadth of the carapace.

Orbits freely communicating with the antennular fossæ: eyestalks immovable and very short, eyes small but well pigmented.

Antennules large, folding transversely; the inter-antennular septum narrow if complete.

Epistome lozenge-shaped, well defined: the sides of the buccal cavern converge slightly from behind forwards: the ischiopodites of the external maxillipeds are rather narrow and leave between them a widish gap, which, however, is filled by the flagella.

There is a deep crescentic groove across the pterygostomian region, just in front of the bases of the chelipeds, and there are several close-set oblique scorings near the antero-lateral angles of the buccal cavern.

Chelipeds in the male unequal, more massive than the legs, the larger one not 1½ times the length of the carapace: under the lens their outer surface is very finely and uniformly granular: the fingers are short, especially in the larger hand, and meet only at tip, and at the base of the dactylus of the larger hand is a molariform tooth.

Legs tomentose: only 3 pairs are present, the 4th pair not being represented even by a rudiment. The first pair, which are not much longer than the chelipeds, are the shortest and slenderest: the next two pairs, which are about equal in size, are not quite twice the length of the carapace.

Sternum very broad, finely and uniformly granular: in the male, in the first sternal segment, on either side of the last abdominal tergum, is a long narrow oblique trench, in which the ends of the modified abdominal appendages are lodged.

Male abdomen very narrow, not a fifth the breadth of the sternum at its base. The first tergum is short fore and aft, the second is linear and has a somewhat trilobed form, the 3rd 4th and 5th are fused to form a sort of hexagonal plate with the distal end narrowed, the 6th and 7th are separate.

The anterior of the two pairs of male abdominal appendages are most curiously modified: they are very long and stiff and are L shaped, and the proximal limb of the L lies beneath and parallel with the abdomen, while the distal limb of the L emerges at right angles to the abdominal tergum, and, instead of being free, lies in the special sternal canal before mentioned.

In the Indian Museum are 2 specimens, from the Bay of Bengal, 65 fathoms. The carapace is 4·5 millim. long and 7 millim. broad.

Family II. PINNOTERIDÆ, Edw.

Key to the Indian genera of Pinnoteridæ.

I. Carapace ill-calcified: the ischium of the external maxillipeds is indistinguishably fused with the much enlarged merus:—
  1. Edges of the carapace swollen and ill-defined: dactylus of the external maxillipeds small and often abnormally placed, but present .... PINNOTERES.
  2. The edge of the carapace, in all but its short fronto-orbital portion, forms a thin upturned crest: dactylus of the external maxillipeds wanting, or represented by a tiny pencil of hairs XANTHASIA.

II. Carapace well calcified: the ischium of the external maxillipeds is distinct and independent:—
  1. Ischium of the external maxillipeds much smaller than the merus: dactylus of the external maxillipeds very large, spathulate. Orbits and eyes normal, the orbits circular .... TETRIAS.

2. Ischium of the external maxillipeds as well developed as the merus, the dactylus not enlarged. The orbits are narrow slits situated dorsally with their long axis almost at right angles with the anterior border of the carapace, and the eyes are minute or obsolescent .... XENOPHTHALMUS.
3. Ischium of the external maxillipeds very much larger than the merus, the appendages as a whole being slender and not nearly closing the buccal cavern. The orbits are in the usual marginal position... CHASMOCARCINOPS.

Subfamily XENOPHTHALMINÆ, nov.

XENOPHTHALMUS, White.

Xenophthalmus, White, Ann. Mag. Nat. Hist. XVIII. 1846, p. 177: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 220: Burger, Zool. Jahrb., Syst. VIII. 1894-95, p. 386.

Carapace broader than long and broadest behind, arched anterolaterally, the regions faintly indicated. Front narrow, strongly deflexed. *The orbits are small, oblique or nearly longitudinal, button-hole like slits, placed dorsally almost at right angles to the frontal border*, and the eyestalks are immovably embedded in them. The eyes are, at most, minute specks of pigment. The antennules and antennæ are extremely small, the antennules folding nearly vertically beneath the front.

Epistome not defined. Buccal cavern almost semicircular, completely closed by the external maxillipeds. The external maxillipeds have the ischium and merus equally well developed (the ischium being nearly square and the merus about a quadrant of a circle) and the palp articulated at the antero-external angle of the merus. Exognath small and concealed.

Chelipeds in the male "with the hands somewhat elongated and thickened," in the female short and very slender.

Legs fairly stout, the third pair the longest.

The abdomen in both sexes consists of seven separate segments.

Key to the Indian species of Xenophthalmus.

I. The legs are ciliated and the third (longest) pair are not twice the length of the carapace .... *X. pinnoteroides*.
II. The legs are ciliated towards the tip only, and the third (longest) pair are more than twice the length of the carapace .... *X. obscurus*.

33. *Xenophthalmus pinnoteroides*, White.

Xenophthalmus pinnotheroides, White, Ann. Mag. Nat. Hist. XVIII. 1846, p. 178, pl. ii. fig. 2, and Samarang Crust. p. 63, pl. xii. fig. 3: Milne Edwards, Ann. Sci.

Nat., Zool., (3) XX. 1853, p. 221: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 107: Sluiter, Tijds. Nederl. Ind. XL. 1881, p. 162: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 394.

This species is included in the Indian Fauna on the authority of Professor J. R. Henderson. It seems to be characterized by having the ischium and merus of the external maxillipeds deeply grooved, longitudinally, near the outer margin; the legs stout and hairy, the third pair barely twice as long as the carapace; and the three terminal joints of the first pair of legs broadened so that their edges are almost carinate: the lateral borders of the carapace are granular or finely denticulate.

34. *Xenophthalmus obscurus*, Henderson.

Xenophthalmus obscurus, J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 394, pl. xxxvi. figs. 18, 19.

Carapace glabrous and shiny, but its surface is somewhat creased: the median regions are separated from the branchial regions by grooves or depressions, and each branchial region is traversed obliquely in its posterior part by a low ridge.

The rounded-off antero-lateral corners of the carapace are traversed by three low fine ridges, nearly parallel with one another: one of these defines the pterygostomian region, the next appears to be the true antero-lateral border, while the most dorsal one runs from the angle of the orbit to the junction of the antero-lateral and postero-lateral borders.

Front narrow, nearly vertically deflexed, longitudinally grooved in the middle line, its free edge square-cut but faintly sinuous. The eyes are just visible as minute linear specks, placed posteriorly.

No epistome. The ischium and merus of the external maxillipeds are not deeply grooved near the outer border.

Chelipeds in the female shorter and much slenderer than the first and last pair of legs.

The 3rd pair of legs are the longest, being about 2¼ times the length of the carapace: the second pair, though a little shorter than the 3rd, are equally stout. The first and last pairs are about equal to one another in size (in the female) being hardly longer than the carapace, and slenderer than the other legs. The terminal joints of all the legs are hairy: the posterior borders of the meropodites of the first three pairs are spiny, the anterior border being very finely serrulate.

In the Indian Museum are two females, one, with eggs, from off the Ganjam coast, 20 fathoms, the other from the Andamans. The carapace in the larger female is 6 millim. long and 8 millim. in greatest breath.

Subfamily ASTHENOGNATHINÆ, Stimps.

CHASMOCARCINOPS, n. gen.

Carapace deep, convex fore and aft and declivous anteriorly: its greatest breadth is quite posterior, so that the postero-lateral borders, which are blunt, are anteriorly-convergent, though slightly so: the antero-lateral borders are sharp and form an elegant curve with the anterior border: the regions are nearly as well defined as they are in *Scalopidia*: its length is hardly less than its breadth.

The fronto-orbital border is considerably more than a third, but the front (which is bilobed) is only about a sixth, the greatest breadth of the carapace.

The orbits, which are in the usual marginal position, are small, and *the eyestalks*, which are immovable, *are shrunk within them*: the eyes are minute.

The antennulary flagella are large and cannot be retracted into the antennular pits, which are filled entirely by the basal joint.

The antennal flagella are long—considerably more than a third the length of the carapace—and stand in the orbital hiatus.

Epistome sunken and not altogether well demarcated from the palate. The buccal cavern has its antero-external angles rounded off, *and is not nearly closed by the external maxillipeds: these have the merus much shorter and narrower than the ischium*, oval and somewhat oblique, and the flagellum appears to articulate with the summit of the merus.

The chelipeds are about as long as the legs and are very unequal in the male.

The third pair of legs are slightly the longest. As in *Scolopidia* the dactylus of the last pair of legs is recurved.

The abdomen in both sexes is narrow, not nearly occupying all the space between the last pair of legs, and in the male consists of 5 pieces, the 3rd–5th segments being fused. In the male also, as in *Camatopsis*, there is, on either side, a narrow plate intercalated between the 4th and 5th segments of the sternum and covering the external genital ducts.

This genus more clearly than any other connects the *Rhizopinæ* and the *Pinnotheridæ* together.

35. *Chasmocarcinops gelasimoides*, n. sp.

Carapace nearly as long as broad, its surface abundantly sprinkled with vesiculous granules, its free margins rather sparsely ciliated: all the regions are distinguishable, and the cardiac and posterior lobe of the gastric regions are defined by deep impressions: the antero-lateral borders are sharply defined and granular. Front very distinctly bilobed, prominent.

Chelipeds in the male very unequal, the larger one being twice as long as the carapace, its chief bulk being contributed by the hand, which, with its large swollen polished palm and long crooked fingers meeting only at tip, recalls that of *Gelasimus*. The smaller cheliped (like the female chelipeds) is not much shorter than the larger one and, like it, has the articulation of the wrist confined to a rather prominent postero-inferior lobe of the hand, and the fingers longer than the palm: the chief difference is that the palm is not enlarged and swollen and that the fingers meet throughout almost all their extent. In both chelipeds the surfaces of all the segments are smooth, and there are sharpish granules along the borders of the arm and at the not very pronounced inner angle of the comparatively slender wrist.

The legs, like the fingers of the smaller cheliped, are fringed, but not very thickly, with hair. The 3rd pair are very slightly the longest, being twice the length of the carapace. The edges of the meropodites are furnished with sharp granules and spinules, these being abundant in the case of the first 3 pairs and rather few on the 4th pair. In the first 3 pairs also the carpopodites are of good length and subcylindrical, and the dactyli straight and almost styliform; but in the 4th pair the two terminal joints are compressed, the carpopodite being shortened and the dactylus recurved.

A male and a female from off Madras, 12 fathoms. The carapace of the male is 11 millim. long and 12 millim. broad.

Subfamily PINNOTHERELINÆ.

TETRIAS, Rathbun.

Tetrias, Rathbun, Proc. U. S. Nat. Mus. XXI. 1898, p. 607.

Carapace strongly calcified, broader than long, deep, subquadrangular, dorsally flattish, anteriorly declivous, the regions faintly indicated.

Front between a third and a fourth the greatest breadth of the carapace, its edge only deflexed, not directly united to the epistome. Orbits circular, small: eyestalks short, eyes small. The antennules fold a little obliquely from the transverse. Antennæ small, the flagellum in the orbital hiatus.

Epistome well defined: buccal cavern broadish, quadrilateral. External maxillipeds large, their palp about as large as their merus and ischium combined: ischium distinct, small; merus very large, carpus large and triangular and articulating at the antero-external angle of the merus, propodite large and articulating with the end of the carpus, dactylus large and spathulate and articulating with the inner angle of the propodite: exognath small and a good deal concealed.

Chelipeds equal, short: the chelipeds in the male equal, and much stouter than the legs.

First 3 pairs of legs coarse, not differing much from each other or from the chelipeds in length, though the second pair are slightly the longest. The fourth (last) pair are very much smaller than the others.

The abdomen of the male is narrow and consists of 7 separate segments.

Tetrias differs very little from *Pinnixa* of which it might, perhaps, be regarded as a subgenus.

Distribution: Indo-Pacific, Andamans to California.

36. *Tetrias Fischeri*, (A. M. E.).
or *Pinnixa* (*Tetrias*) *Fischeri* (A. M. E.).

Pinnotheres Fischeri, A. Milne Edwards, Ann. Soc. Entomol. France, VII. 1867, p. 287.

Pinnixa Fischeri, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 319, pl. xviii. fig. 3: de Man, Archiv fur Naturges. LIII. 1887, i. p. 385, pl. xvii. fig. 2.

Carapace and appendages everywhere covered by a close adherent coat of short hair. The regions of the carapace are fairly well indicated and its dorsal surface is closely and finely granular, except in the middle where also the hair is somewhat deficient. Deflexed edge of the front broadly triangular. Eyes well pigmented. The inner edge of the carpus and the inner and distal edges of the large spathulate dactylus of the external maxillipeds are fringed with a close row of hairs of extraordinary length.

Chelipeds in the male much more massive than the legs, and about 1½ times the length of the carapace: their movements are somewhat restricted. There are some spinules at the inner angle of the wrist, and numerous rows of granules—the lowermost row rather acute—on the outer surface of the palm: the fingers, which are shorter than the palm, are stumpy but sharp-pointed.

The first 3 pairs of legs are coarse and are all about 1½ times the length of the carapace, though the second pair are very slightly the longest. The 4th pair are very short—not two thirds the length of the carapace—and are much slenderer than the others. All the legs have a shaggy posterior border, and all end in small hooked dactyli. The posterior border of the meropodite of the last pair is armed with small coarse spines.

The abdomen of the male is narrow and consists of 7 segments: the first two segments are very short, the 3rd 4th and 5th gradually increase in length and slightly decrease in breadth, the 6th is a little shorter than the 5th, and the 7th is long and spathulate and encroaches on the buccal cavern.

In the Indian Museum is a single male specimen, from coral, from the Andamans: its carapace is a little over 5 millim. long and 7 millim. broad.

Subfamily PINNOTERINÆ.

*PINNOTERES, Latreille.

Pinnotheres, Latreille, Hist. Nat. Crust. et Ins. VI. p. 78, and Gen. Crust. et Ins., p. 34: Lamarck, Hist. Nat. An. Sans. Vert. (2nd edit. Vol. V. p. 410): Bosc, Hist. Nat. Crust. I. p. 239: Leach, Malac. Pod. Britt.: Desmarest, Consid. Gen. Crust. p. 116: De Haan, Faun. Japon. Crust., p. 34: Milne Edwards, Hist. Nat. Crust. II. 30, and Ann. Sci. Nat., Zool., (3) XX. 1853, p. 216: Dana, U. S. Expl. Exp. Crust. pt. I. p. 378: Bell, British Stalk-eyed Crust. p. 119: Miers, Challenger Brachyura, p. 275: Ortmann, Zool. Jahrb., Syst., VII. 1894, p. 698: Bürger, Zool. Jahrb. Syst., VIII. 1894-95, p. 362: Adensamer, Ann. Nat. Hofmus., Wien, 1897, p. 105.

Carapace often ill calcified, generally convex with ill-defined edges, in shape transversely oval, or circular, or subquadrangular or subhexagonal with rounded angles, the surface generally smooth, the regions seldom defined.

Front narrow, generally deflexed in the female if not in the male. Orbits small, circular, eyestalks short, eyes small. Antennules folding obliquely in small pits. Antennæ small, the minute flagellum standing in the inner angle of the orbit.

Epistome well defined. The buccal cavern is of a curious crescentic shape, being arched and very broad from side to side, but very narrow fore and aft. The external maxillipeds completely close the buccal cavern: they consist chiefly of the merus, which is fused with the ischium to form a single large obliquely-directed joint carrying the flagellum at its inner end: the flagellum is small though its propodite may be spathulate, and the dactylus is often inserted on the inner or flexor border of the propodite: the exognath is for the most part concealed.

The chelipeds and legs are short, the chelipeds being equal and generally, even in the female, stouter than the legs.

The abdomen in the male is narrow, in the female it is generally larger than the sternum: it consists of 7 separate segments.

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* *Pinnoteres*, the correct transliteration of the Greek word, was used by Rumph in 1705, so that no apology is necessary for reverting to it.

The Pinnoteræ live as parasites or messmates, generally within the mantles of Lamellibranch Mollusks.

Key to the Indian species of Pinnoteres.

- I. The dactylus of the external maxillipeds is articulated far back on the inner or flexor edge of the propodite: the eyes in the female are not entirely visible in an ordinary dorsal view:—
  - 1. The dactyli of all the legs are about equal:—
    - i. Carapace somewhat octagonal in outline, with deepish tomentose pits separating the branchial from the median regions: first three pairs of legs nearly equal in length: dactyli of all the legs of fair length………… *P. Edwardsi.*
    - ii. Carapace circular, perfectly smooth: second pair of legs decidedly the longest: dactyli of all the legs very short………………… *P. mactricola.*
  - 2. Dactylus of the 3rd pair of legs longer than any of the others ……………………………… *P. purpureus.*
  - 3. Dactylus of the 4th pair of legs longer than any of the others ……………………………… *P. parvulus.*
- II. The dactylus of the external maxillipeds is articulated to the tip of the propodite: the eyes in the female are entirely dorsal ……………………………… *P. abyssicola.*

37. *Pinnoteres Edwardsi*, de Man.

Pinnotheres Edwardsi, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 103, pl. vi. figs. 6-9 (1889).

The description applies to the female.

The length of the carapace is nearly equal to the greatest breadth. Carapace octagonal in shape, with the angles rounded: its dorsal surface little convex, with tomentose depressions of some size and depth separating the median from the branchial regions. The deflexed part of the front is very distinctly triangular. Eyes very small, but deeply pigmented.

Dactylus of external maxillipeds slender and inconspicuous; placed far back on the inner edge of the spathulate propodite.

Chelipeds and legs more or less downy, especially on their under surface. Chelipeds nearly as long as the carapace, a little longer and much stouter than the legs, unarmed: dactylus as long as the upper border of the palm.

Legs rather coarse: the first 3 pairs are about equal in length, the 4th pair is a little shorter.

Carapace 15 millim. long and 16 millim. broad.

From an *Ostræa* from Mergui.

38. *Pinnoteres purpureus*, n. sp.

Closely related to *P. palaensis*, Bürger.

The description applies to the female.

Carapace and appendages smooth, polished, nude. Carapace transversely oval, strongly convex, the regions not well defined. Deflexed part of front broadly and indistinctly triangular. Eyes very small, but well pigmented.

Dactylus of external maxillipeds slender and inconspicuous, placed far back on the inner (flexor) edge of the propodite.

Chelipeds and legs slender, the chelipeds being little stouter than the legs and about the same length as the first pair of legs. The movable finger is not much more than half the length of the upper border of the palm.

The third pair of legs are the largest of all, their meropodites and carpopodites being longer than those of the first two pairs and nearly twice as long as those of the 4th pair. The dactyli of the 3rd and 4th pairs are several times the length of those of the first two pairs, and *the dactylus of the 3rd pair exceeds that of the 4th pair.* Though the 4th pair have a long dactylus their total length is not greater than that of either of the first two pairs.

Colour either hyaline with numerous minute specks of bluish-black pigment, or the specks may be sufficiently numerous to make the whole animal nearly black.

From an *Ostræa* from the Andaman Islands.

Carapace 7 millim. long and 9 millim. broad.

39. *Pinnoteres parvulus*, Stimpson, de Man.

Pinnotheres parvulus, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 108: de Man, Journ. Linn. Soc.; Zool., XXII. 1887–88, p. 105, and Archiv fur Nat. LIII. 1887, i. p. 383: Ortmann, Zool. Jahrb., Syst., VII. 1893–94, p. 699: Bürger, Zool. Jahrb., Syst., VIII. 1894-95, pp. 363, 376, pl. ix. fig. 18 and x. fig. 17.

A single damaged female appears to differ from *P. purpureus* only in the following particulars:—

(1) though the 4th pair of legs are shorter than the 3rd, they are decidedly longer than the 2nd, and still more decidedly longer than the 1st.

(2) the dactylus of the 4th pair of legs is the longest of all.

40. *Pinnoteres mactricola*, n. sp.

Closely related to *P. cardii*, Bürger.

The description applies to the female.

Carapace perfectly circular smooth and polished, convex. Edge of front nearly straight. Eyes minute, well pigmented.

Dactylus of external maxillipeds slender and inconspicuous, arising far back on the inner (flexor) edge of the propodite.

Chelipeds decidedly stouter than the legs and about as long as the first pair of legs: their inner border is scantily fringed with hair: their dactylus is nearly two-thirds the length of the palm.

Legs slender, fringed with hairs: the second pair are decidedly the longest—a little longer than the carapace: the fourth pair are decidedly the shortest: the first and third pairs are about equal in length: in all four pairs the dactyli are equally short.

From *Mactra violacea*, from the mouth of the R. Hooghly.

Diameter of carapace not quite 6 millim.

In the male the front is a little prominent and the chelipeds are very much stouter.

41. *Pinnoteres abyssicola*, Alcock and Anderson.

Pinnoteres abyssicola, Alcock and Anderson, Ann. Mag. Nat. Hist. (7) III. 1899, p. 14: Alcock, Investigator Deep Sea Brachyura, p. 81.

The description applies to the female.

Carapace subcircular, smooth, convex. Front rather prominent, little deflexed, broadly triangular. Eyes of good size but deficient in pigment, entirely dorsal.

The palp of the external maxillipeds is minute and is much concealed by hairs that fringe the prominent internal angle of the merus: the dactylus is borne at the tip of the propodite.

Chelipeds much stouter than the legs, nude except for a fringe of hairs on the lower border of the immobile finger: they are about as long as the carapace, and the dactylus is not much shorter than the upper border of the palm.

Legs slender, nude: the 2nd and 3rd pairs are slightly longer than the 1st and 4th, being nearly 1½ times the length of the carapace: the dactyli also of the 2nd and 3rd pairs are a little longer than those of the 1st and 4th.

From *Lima indica*, from 430 fathoms off the Travancore coast.

Diameter of carapace 8 millim.

XANTHASIA, White.

Xanthasia, White, Ann. Mag. Nat. Hist. XVIII. 1846, p. 176: Dana, U.S. Expl. Exp., Crust., pt. I. p. 383: Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1853, p. 221: Bürger, Zool. Jahrb., Syst., VIII. 1894–95, p. 386.

Resembles *Pinnoteres* in structure and habit, but differs in the following particulars:—

The edge of the carapace is well defined and, in all but its fronto-orbital portion, forms an upturned crest, so that the dorsal surface of the carapace is depressed and saucer-like. Other crests are found on the dorsal surface of the carapace and, in the centre, a large mushroom-like tubercle.

Though it is on an inferior plane, the narrow front is prominent and not deflexed.

The buccal cavern and mouth-parts have the same curious form, except that (owing to the encroachment of the epistome in the middle line) the anterior edge of the buccal cavern is bilobed or bow-shaped rather than semicircular, and the dactylus of the external maxillipeds is wanting or is represented by a few hairs.

Distribution : Indo-Pacific, from the east coast of Africa to Fiji.

42. *Xanthasia murigera*, White.

Xanthasia murigera, White, Ann. Mag. Nat. Hist. XVIII. 1846, p. 177, pl. ii. fig. 3 : Dana, U. S. Expl. Exp., Crust. pt. I. p. 384, pl. xxiv. figs. 6 *a-b* : Milne Edwards, Ann. Sc. Nat., Zool., (3) XX. 1853, p. 221 : A Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p 321 : Haswell, Cat. Austral. Crust. p. 113 : Miers, Zool. H. M. S. Alert, pp. 518, 546 : de Man, Journ. Linn. Soc., Zool., XXII. 1887–88, p. 106 : Bürger, Zool. Jahrb., Syst. VIII. 1894–95, p. 386, pl. x. fig. 33 : Adensamer, Ann. KK. Nat. Hofmus. Wien, XII. 1897, p. 109 : Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 264.

The edge of the carapace is formed, in all but its short fronto-orbital portion, by a thin sharp upturned overhanging crest, which ends in a curl on the anterior part of either branchial region.

A large mushroom tubercle, having a rough or reticulate surface and a more or less reniform outline, occupies the middle of the dorsal surface of the carapace, and between this and the front is a pair of parallel longitudinal crests.

The front is somewhat prominent and is dorsally grooved or obscurely bilobed, and on each side of it, beyond the small orbits, is a small wing-like projection.

Chelipeds not, or hardly, stouter than the legs : the dactylus in the male is about two-thirds, in the female not much more than half the length of the palm.

Legs rather coarse : the first three pairs, which are about equal to one another and to the chelipeds in length, are about as long as the carapace, the fourth pair are a little shorter : the dactyli in all are about equally short.

In the female the broad abdomen is traversed longitudinally by a sort of coarse interrupted carina.

In the Indian Museum are 5 specimens from the Andamans and Mergui. The carapace of the largest female is 11·5 millim. long and 15·5 millim. broad.

The *Xanthasia* sp., or *Xanthasia Whitei*, from Mergui, referred to by de Man in Journ. Linn. Soc., Zool., XXII. 1887–88, p. 106, pl. vii. fig. 1 is represented in the collection by a single small male and is characterized by having the upraised edge of the carapace blunt and rounded, instead of thin and acute, and the median tubercle of the carapace ill defined instead of sharply circumscribed: the posterior margin of the carapace, also, is more prominent and is not quite continuous with the lateral margins. The legs also are somewhat longer.

Family OCYPODIDÆ, Ortmann, emend.

Key to the Indian genera of Ocypodidæ.

- I. A hairy-edged pouch leading into the branchial cavity, between the bases of the 2nd and 3rd pair of true legs [*Ocypodinæ*]:—
  - 1. Antennular flagella rudimentary, completely hidden beneath the front: antennæ small, almost rudimentary: eyes very large, occupying the greater part of the ventral surface of the eyestalks: chelipeds very unequal in both sexes .... OCYPODA.
  - 2. Antennular flagella small, not hidden beneath the front: antennæ of good size: eyes small, terminal on the long slender eyestalks: in the male only, one cheliped is enormously enlarged the other being very small .... GELASIMUS.
- II. No pouch or opening between the bases of any of the legs:—
  - 1. The antennules fold obliquely or nearly vertically: curious membranous spaces, or "tympana," are present on the meropodites of the legs (*Scopimerinæ*):—
    - i. Tympana very well defined: external maxillipeds very large and with a strong almost hemispherical bulge forwards:—
      - *a.* Merus of external maxillipeds larger than the ischium: the distal end of the 4th abdominal segment of the male is fringed with bristles and overlaps the 5th segment .... DOTILLA.
      - *b.* Ischium of external maxillipeds larger than the merus: the 4th abdominal segment of the male is normal, but the 5th is constricted in part or all of its extent and gives the abdomen a wasp-like appearance .... SCOPIMERA.

- ii. Tympana ill defined: external maxillipeds of moderate size, the merus larger than the ischium: the chelipeds of the female, though not so stout as those of the male, are stouter than the legs ...... TYMPANOMERUS.

2. The antennules fold obliquely or quite transversely: no "tympana" are present on any of the joints of the legs (*Macrophthalminæ*) :—
   - i. Merus of the external maxillipeds smaller than the ischium, the flagellum coarse and articulating at the antero-external angle of the merus: front deflexed: eyestalks often very long ...... MACROPHTHALMUS.
   - ii. Merus of the external maxillipeds as large as or larger than the ischium, at least the two terminal joints of the flagellum are slender: eyestalks not particularly long :—
     - *a.* Front declivous: carapace slightly convex: the flagellum of the external maxillipeds articulates at the antero-external angle of the merus: (the chelipeds of the female, as in all *Macrophthalminæ*, are shorter and slenderer than the legs) .... CLISTOSTOMA.
     - *b.* Front square-cut, not in the least deflexed; carapace quite flat dorsally: the flagellum of the external maxillipeds articulates near, but not at, the antero-external angle of the merus: eyes not terminal on the eyestalks .... TYLODIPLAX.

Subfamily OCYPODINÆ, Dana.

OCYPODA, Fabr.

Ocypoda, Fabricius, Ent. Syst. Suppl. p. 347: Desmarest, Consid. Gen. Crust. p. 119, and Dict. Sci. Nat. XXVIII. p. 239: De Haan, Faun. Japon. Crust. p. 29: Milne Edwards, Hist. Nat. Crust. II. 41, and Ann. Sci. Nat., Zool., (3) XVIII. 1852 p. 141: Dana, U. S. Expl. Exp. Crust. pt. I. p. 324: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 179: Miers, Ann. Mag. Nat. Hist. (5) X. 1882, p. 376, and Challenger Brachyura, p. 237: Ortmann, Zool. Jahrb., Syst., X. 1897-98, p. 359 (*Revision der Gattung* Ocypoda).

Carapace deep, square or subquadrilateral, broader (but not much broader) than long, moderately convex, strongly declivous anteriorly, its dorsal surface closely granular with the regions indistinctly and incompletely defined. Front a narrow deflexed lobe, from a seventh to an eighth the greatest breadth of the carapace.

Orbits very capacious, occupying the whole face of the carapace between the front and the antero-lateral angles on either side, usually not very deep: their floor is divided into two fossæ, one for the basal portions of the eyestalk, the other for the eye. The basal joint of the eyestalk is visible throughout: the eye chiefly occupies the ventral surface of the eyestalk, and is often, but not always, tipped by a horn or style formed by a prolongation of the latter.

The basal antennular joint is visible, but the rudimentary antennular flagellum is quite hidden beneath the front. The antennæ, which lie in the orbital hiatus, are, though properly formed in all their parts, little more than rudiments.

The epistome, though short, is quite distinct, and is sculptured. The buccal cavern (in its widest part) is as broad as long, but diminishes in size a little, anteriorly: it is completely closed by the external maxillipeds, which are somewhat narrow and elongate and end in a coarse flagellum that articulates with the antero-external angle of the merus.

Chelipeds shorter than the legs and, in both sexes, remarkably unequal, the larger one being much more massive than the legs. The palm is short and high—especially in the larger cheliped—and is almost always compressed—especially so in the smaller cheliped: the fingers are stout, usually compressed, and strongly toothed. In most cases there is, on the inner surface of the larger palm, near the fingers, a stridulating organ, which can be scraped against the inner surface of the ischium.

Legs stout, the fourth pair much shorter and somewhat less massive than the first three pair, which are of about equal length: between the basal joints of the 2nd and 3rd pair is an orifice, thickly protected by hairs, leading towards the branchial cavity. The branchial cavity is very capacious, and its lining membrane is thick spongy and vascular.

The abdomen of the male is narrow: in both sexes it consists of seven separate segments.

Distribution: Tropical and subtropical coasts, from the American Atlantic, through the Mediterranean and Red Seas, to the American Pacific.

The Ocypodes live together in large companies, and most of them are in the habit of digging long and tortuous burrows in the moist sand near high-water mark, into which they retire with great rapidity when alarmed. As a rule they do not go far from their burrows, but if they do happen to wander and are cut off, they run to sea with marvellous speed. Though the burrows can be but temporary structures, each individual crab, in all the species that I have observed, keeps rigidly to its own. The efficacy of the stridulating-organ as a musical instrument is beyond dispute, and I have published my own observations on that of *O. macrocera* in the Administration Report of the Marine Survey of India for the year 1891–92 (reprinted in the *Annals and Magazine of Natural History* for 1892). Dr. A. R. Anderson has published a note on the sound produced by *O. ceratophthalma* in this *Journal* for the year 1894.

My own opinion is that these crabs use the stridulating-organ when in their burrows—which undoubtedly are private property—to warn intending intruders of the herd that the burrow is occupied, and thus to prevent the burrow becoming crowded to suffocation-point. This, of course, need not be its exclusive use.

Key to the Indian species of Ocypoda.

- I. No stridulating ridge on the inner surface of the palm: eyestalks not prolonged beyond the eyes in the form of a style .... *O. cordimana.*
- II. A stridulating ridge on the inner surface of the palm: eyestalks (except sometimes in the young) prolonged beyond the eyes to form a horn or style:—
  - 1. Length of the stridulating organ much more than half the greatest breadth of the palm: antero-lateral angles of the carapace well pronounced:—
    - i. Fingers of both chelipeds pointed:—
      - *a.* Stridulating ridge narrow, consisting entirely of small tubercles: no brushes of hairs on the propodites of any of the legs .... *O. platytarsis.*
      - *b.* The stridulating ridge consists of tubercles gradually passing into striæ: the anterior surface of the propodites of the first two pairs of legs thickly furnished with hairs ... *O. ceratophthalma.*
    - ii. Fingers of the smaller cheliped expanded at tip: the stridulating ridge consists entirely of striæ... *O. macrocera.*
  - 2. Length of the stridulating organ much less than half the greatest breadth of the palm: antero-lateral angles of the carapace rounded off .... *O. rotundata.*

The synonomy of the species of *Ocypoda* has been discussed, at length, by Ortmann (Zool. Jahrb., Syst., X. 1897–98, p. 359), who has had access to a great deal more material than I have. It would be inadvisable, therefore, for me, working on a collection made almost entirely in India, to attempt any independent criticism of the older work; so that, in dealing with the Indian species, I shall generally restrict my citations to the papers of Ortmann and the other authors (Kingsley and Miers) who have made a revision of the genus.

43. *Ocypoda ceratophthalma* (Pallas), Ortm.

Cancer ceratophthalmus, Pallas, Spicilegia Zool. IX. p. 83, pl. v. figs. 7, 8.

Cancer cursor, Herbst, Krabben, I. ii. 74, pl. i. figs. 8, 9.

Ocypoda ceratophthalma, Fabricius, Ent. Syst. Suppl. p. 347: Milne Edwards, Hist. Nat. Crust. II. 48, and Cuvier Règne An. Crust. pl. 17: Kingsley, Proc. Ac.

Nat. Sci. Philad. 1880, p. 179: Miers, Ann. Mag. Nat. Hist. (5) X. 1882, pp. 378, 379: C. W. S. Aurivillius, Zur. Biol. Amphib. Decap., p. 17 (Mitg. K. Ges. Wiss. Upsala, 1893).

ORTMANN, ZOOL. JAHRB., SYST. X. 1897-98, pp. 360, 364 (*ubi synon.*).

Carapace square, its greatest breadth, which is about a tenth more than its greatest length, is at the acuminated antero-lateral angles, which coincide with the outer orbital angles and are right angles, or nearly so.

The borders of the carapace, with the exception of the posterior border, are elegantly beaded or serrulate, and the lateral borders in their anterior third are straight and parallel, or nearly so.

The cardiac region can be distinguished, and the anterior ends of the cervical groove are present on either side of the gastric region.

Upper border of orbit sinuous and a little oblique, so that the outer angle of the orbit is considerably behind the front: the lower border has an obscure notch near its middle, but there is *no gap at its outer angle.* The eyestalk is prolonged beyond the eye into a blunt-pointed style of variable length.

The lateral borders of the buccal cavern, though their general direction is slightly convergent anteriorly, have a distinct outward curve. The merus and ischium of the external maxillipeds have their exposed surface circumscribed by a raised row of granules, which is deficient only at the basal attachment of the ischium.

Chelipeds and legs scabrous, the asperities having in many places a tendency to a rugiform or squamiform arrangement, and almost forming serrations on the borders of some of the joints, and becoming spines or teeth on the lower borders of the arms and hands and at both angles of the wrist—especially at the inner angle where there is always at least one distinct spine.

The stridulating organ of the larger palm is of good length (much more than half the greatest breadth of the palm) and is some little distance from the immobile finger, a thick strip of hair intervening: in its upper half it consists of tubercles gradually passing to striæ, in its lower half it consists of a comb of fine regular and very close-set striæ. It plays against a polished ridge that runs across the upper part of the inner surface of the ischium.

The palms and fingers of both hands—but notably of the smaller hand—are compressed, and the fingers of both hands are *pointed.*

The first three pairs of legs have the merus broadened: they do not differ greatly in length, and the 2nd pair, which are slightly the longest, are about two-and-a-half times the greatest length of the carapace. The fourth (last) pair are a good deal shortened—reaching only a little more than half-way along the propodite of the 3rd pair—and have a much narrower merus. In all the legs the dactylus is stout and fluted like a bayonet and has more or less of its anterior surface hairy: though somewhat laterally-compressed at base and gradually broadening and becoming dorso-ventrally-compressed towards the tip, it may fairly be called styliform. The propodites of the first two pairs of legs have conspicuous brushes of hairs along their anterior surface.

In the Indian Museum are 84 specimens from all parts of the coasts of the mainland and islands of India. Large specimens have the carapace 40 millim. long and about 45 millim. in greatest breadth.

Distribution: Indo-Pacific, from the east coast of Africa to the Sandwich Islands.

In young specimens the surface of the appendages is smoother and the eyestalks are not prolonged beyond the eyes, which are of large size. In half-grown specimens the terminal style of the eyes is still short.

44. *Ocypoda macrocera*, Edw.

Ocypoda macrocera, Milne Edwards, Hist. Nat. Crust. II. 49: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 181: Miers, Ann. Mag. Nat. Hist. (5) X. 1882, pp. 378, 381: ORTMANN, ZOOL. JAHRB., SYST., X. 1897–98, pp. 360, 368.

Closely related to *O. ceratophthalma*, from which it is distinguished by the following characters:—

(1) the carapace is rather broader and the orbits are a little more oblique:

(2) the raised marginal row of granules on the external maxillipeds is less pronounced:

(3) the fingers of the smaller cheliped are lamellar up to the tips, which are broad and blunt, not pointed:

(4) the stridulating ridge is less hairy and consists entirely of striæ.

(5) it is a smaller species, large specimens having the carapace 31 millim. long and 37 millim. broad.

In the Indian Museum are 78 specimens from the coasts of the Bay of Bengal: there are none from the west coast or from any of the islands, and the species appears to be confined to the Bay.

The colour, in life, is bright red. This species lives in large warrens in the sands of almost all parts of the east coast of the peninsula. One of its most active enemies is the Brahminy kite (*Haliastur indus*). One almost certain use of the stridulating-organ is to give warning to intending trespassers, of its own species, that a burrow is already occupied by its rightful owner.

45. *Ocypoda platytarsis*, Edw.

Ocypoda platytarsis, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII. 1852, p. 141: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 180: Miers, Ann. Mag. Nat. Hist. (5) X. 1882, pp. 378, 383: ORTMANN, ZOOL. JAHRB., SYST., X. 1897–98, pp. 359, 363 (*ubi synon.*).

This species may be distinguished from *O. ceratophthalma*, which it closely resembles, by the following characters :—

(1) the carapace is very distinctly broader, its length being about four-fifths of its breadth, and the orbits are hardly at all oblique :

(2) the surface of the ischium of the external maxillipeds is often quite smooth :

(3) the stridulating ridge is not, or hardly at all, hairy and consists entirely of granules or small mamillated tubercles ; and though the upper edge of the inner surface of the ischium of the larger cheliped is raised and rough, there is no special process against which the stridulating-ridge of the palm can be scraped :

(4) the dactyli of the legs, though fluted as in the other species, are distinctly compressed dorso-ventrally and broadened :

(5) there are no brushes of hairs along the anterior surface of the propodites of any of the legs.

It is a somewhat larger species, the carapace in full-sized adults being 40 millim. long and 54 millim. broad.

In the Indian Museum there are 42 specimens from both coasts of the peninsula and from Ceylon.

46. *Ocypoda rotundata*, Miers.

Ocypoda rotundata, Miers, Ann. Mag. Nat. Hist. (5) X. 1882, pp. 378, 382: Ortmann, Zool. Jahrb., Syst., X. 1897–98, pp. 360, 364.

This species differs from *O. ceratophthalma* in the following important particulars :—

The carapace is less distinctly quadrilateral, owing to the fact that the antero-lateral borders are arched, instead of forming an angle with the upper border of the orbit. These borders sometimes form an unbroken curve with the upper border of the orbit, but sometimes the junction between the two is marked by a notch. The length of the carapace is about five-sixths its greatest breadth, which, owing to the curvature of the antero-lateral borders, is some distance behind the orbits.

There is a notch in the middle of the lower border of the orbit, and a gap at the outer angle, between the upper and lower borders.

The deflexed tip of the front is swollen.

The spines or serrations at the inner angle of the wrist are more numerous, and at the outer angle are better marked.

The length of the stridulating organ is much less than half the greatest height of the palm : the organ consists of about a dozen distant ridges much concealed in hair, and each ridge is sharply serrated.

The scraper on the ischium is placed near the upper angle of the inner face of that joint and consists of an elongate-elliptical longitudinally-grooved cicatrix-like surface, with a patch of hair above it and a much larger patch below it.

The fingers of the smaller cheliped are almost as much dilated at tip as those of *O. macrocera*.

The dactyli of the legs are dorso-ventrally compressed as in *O. platytarsis*.

There is a thick brush of hairs along the anterior surface of the propodite of the first pair of legs only.

The meropodites of the first three pairs of legs are not so broad as in the three preceding species.

In the Indian Museum are 29 specimens from the coasts of Cutch, Sind, and Baluchistan.

This is the largest Indian Ocypode, the carapace of the adult being 52 millim. long and 62 millim. broad.

47. *Ocypoda cordimana*, Desm.

Ocypoda cordimana, Desmarest, Consid. Gen. Crust. p. 121 : Milne Edwards, Hist. Nat. Crust. II. 45 : Kingsley, Proc. Ac. Nat. Sci. Philad., 1880, p. 185 : de Man, Notes Leyden Mus., III. 1881, p. 248 : Miers, Ann. Mag. Nat. Hist. (5) X. 1882, pp. 379, 387 : ORTMANN, ZOOL. JAHRB., SYST., X. 1897–98, pp. 359, 362 (*ubi synon.*).

Carapace deep, quadrilateral, strongly convex fore and aft, its length about seven-eighths its greatest breadth, which is some little distance behind the orbits, owing to the gentle curve of the antero-lateral borders : its antero-lateral angles coincide with the outer orbital angles, and point acutely forwards.

Orbits deep ; their upper border sinuous, but not in the least oblique ; there is usually a notch near the middle of their lower border, and always a deep gap at the outer angle. No terminal style to the eyes.

The lateral borders of the buccal cavern are anteriorly convergent and have no outward curve. The marginal row of granules on the outer surface of the ischium of the external maxillipeds is indistinct or absent.

Though the chelipeds and legs are rough and the roughness is in places squamiform, there is no serration of their edges, except in the case of the lower borders of the arms, the inner edge of the wrists, and the lower border of the hands. The palm of the larger hand, though deep, is not particularly compressed, and it has no stridulating ridge.

The propodites and dactyli of the legs are rather short and stout, the dactyli being fluted and more or less hairy: the edges of the propodites of the first 2 pairs of legs are hairy. The third pair of legs, which are slightly longer than the first 2 pairs, are less than twice the length of the carapace.

In the Indian Museum are 59 specimens, from the Laccadives, the Madras coast, Ceylon, Mergui, Tavoy, the Andamans and Nicobars.

The carapace of the largest specimen is 35 millim. long and 40 millim. broad.

GELASIMUS, Latr.

Gelasimus, Latreille, Dict. des Sciences Nat. XVIII. p. 286 (1820): Desmarest, Consid. Gen. Crust. p. 122, and Dict. Sci. Nat. XXVIII. p. 241: De Haan, Faun. Japon Crust. p. 25: Milne Edwards, Hist. Nat. Crust. II. 49, and Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 144: Dana, U. S. Expl. Exp. Crust. pt. I, pp. 312, 315: Hess, Archiv f. Naturges. XXXI. 1865, p. 145: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 271: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, pp. 135, 136: Miers, Challenger Brachyura, p. 241: de Man, Notes Leyden Mus. XIII. 1891, pp. 20-23: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, pp. 749-753.

"*Uca*," Leach, Trans. Linn. Soc. XI. 1815, pp. 309, 323: M. J. Rathbun, Proc. Biol. Soc. Washington, XI. 1897, p. 154: Ortmann, Zool. Jahrb., Syst., 1897-98, p. 346 (cf. notes by Desmarest and Milne Edwards, *ll. cc. supra*).

In obedience to certain interpretations of the rule of priority, which sacrifice everything to a legal precision that defeats the object of classification, some modern authors propose to apply the name *Uca*, which was originally given to and has for nearly seventy-five years been authoritatively used for a land-crab of the Gecarcinoid family, to the species of the Ocypodoid family which have for the same long period been known to everybody by the name *Gelasimus*.

One of the objects of my poor work being to avoid confusion, I cannot consent to this proposal: and if the rules of nomenclature do not permit me to retain a name that has been deliberately chosen, and used without any ambiguity, by such illustrious predecessors as Latreille, Milne Edwards, and Dana, then I think that the rules should be modified.

The introduction of a rule sanctioning the retention of any name that has been accepted and defined by a monographer of repute, and that has thereafter been in common use for fifty years, would probably satisfy those to whom the written authority of the law is a consideration of first importance.

Carapace deep, subquadrilateral but with the antero-lateral angles produced and acute and the lateral borders more or less convergent posteriorly, occasionally subhexagonal, a good deal broader than long, the regions never very strongly defined. The front is a narrow declivous lobe, the breadth of which, between the eyestalks, is from one-sixteenth to one-sixth the greatest breadth of the carapace.

The orbits are narrowish trenches occupying the whole anterior extent of the carapace between the narrow front and the antero-lateral angles, and are more or less sinuous and oblique: the eyestalks are very long and are formed as in *Ocypoda*, but are much slenderer: the eyes, though chiefly ventral in aspect, are always terminal.

The small antennular flagella, which are not hidden under the front, fold obliquely. The antennæ, which stand free at the inner angle of the orbits, have well developed flagella.

Epistome, though short, quite distinct. The lateral borders of the buccal cavern are convex outwards, sometimes so much so as to give the cavern a subcircular outline. The external maxillipeds have a long ischium and a short and somewhat oblique merus with the coarse flagellum jointed to its antero-external angle: they close the buccal cavern except for a chink anteriorly.

The chelipeds differ greatly in the sexes. In the female they are equal, are shorter and slenderer than the legs, and have broad-tipped spoon-shaped fingers. In the male one of the chelipeds resembles those of the female, but the other is of relatively gigantic proportions, the hand alone being often as big and heavy as all the rest of the animal.

The legs are stout and end in very sharp dactyli, and the meropodites of at least the 2nd and 3rd pairs are foliaceous: these two pairs are a little longer than the other two, being about twice the length of the carapace.

As in *Ocypoda*, the branchial cavity is capacious, and its lining membrane thickened and vascular, with a fleshy lobe, shaped like a gill-plume, projecting into the space between the tips of the last two gill-plumes: also, between the basal joints of the 2nd and 3rd pairs of legs, there is an orifice, thickly protected by hairs, leading towards the branchial cavity.

The abdomen of the male is narrow: in both sexes of all the Indian species it consists of seven separate segments.

Distribution: all the warmer regions of the globe, from the Atlantic coasts of America eastwards (including the Mediterranean basin) to the Pacific coasts of America again.

The species of *Gelasimus* are, like the Ocypodes, gregarious, and live in warrens in the mud-flats of tropical and subtropical estuaries. Their intelligence, like that of the Ocypodes, is of a high order.

In one species, at any rate (*Gelasimus annulipes*), the males, which are greatly in excess of the females, use the big and beautifully-coloured cheliped, not only for fighting with each other, but also for "calling" the females. I have described my own observations on these points in the *Administration Report of the Marine Survey of India for* 1891-92—reprinted, as an extract, in the *Annals and Magazine of Natural History* for 1892.

The fact that the males greatly outnumber, and therefore are more commonly captured than, the females, is sufficient justification for the common practice of using the larger cheliped of the male for the discrimination of the species. It must, however, be remembered that—at least in all the Indian species—this organ changes greatly with advancing age.

I must also confess here that the synonomy of species has defied me.

Key to the Indian species of Gelasimus.

- I. The breadth of the front, measured exactly between the bases of the eyestalks, is between a fifth and a sixth the greatest breadth of the carapace :—
  - 1. Two oblique granular ridges on the inner surface of the palm of the large cheliped of the male, one continuous with the dentary edge of the immobile finger, the other running to the lower edge of the same finger :—
    - i. Carapace subquadrilateral, the true lateral borders being moderately convergent posteriorly : an enlarged tooth near the tip of the immobile finger of the large cheliped of the male gives the tip of this finger a notched-truncate appearance *G. annulipes.*
    - ii. Carapace subquadrilateral, the true lateral borders nearly parallel : the tip of the immobile finger of the large cheliped of the male is oblique-truncate but not notched .... *G. lacteus.*
    - iii. Carapace distinctly hexagonal, owing to the great obliquity of the orbits and the strong convergence posteriorly of the true lateral borders : tip of the immobile finger of the large cheliped of the male not truncate or notched .... *G. triangularis.*
  - 2. The oblique crest running to the lower edge of the immobile finger of the large cheliped of the male is either absent or is represented by a slight and smooth tumescence .... *G. inversus.*
- II. The breadth of the front, measured as above, is very much less than a sixth the greatest breadth of the carapace :—
  - 1. No row of granules running inside of and parallel with the lower border of the orbit :—
    - i. The inner border of the arm of the larger cheliped of the male ends in a sharp tooth or spine, independent of the terminal lobe-like constriction of the arm :—
      - *a.* Front, measured as above, about a tenth the greatest breadth of the carapace : in the large cheliped of the male the wrist is

smooth, the palm full with the granular ridges on the inner surface indistinct, and the fingers are not specially compressed... *G. tetragonum.*

- *b.* Front, measured as above, not a fifteenth the greatest breadth of the carapace: in the large male cheliped the upper surface of the wrist is granular and the fingers are remarkably compressed and blade-like:—
  - *α.* In the large male cheliped the crests on the inner surface of the palm are moderately prominent, the dactylus is quite blade-like and the cutting-edge of the immobile finger is not much scallopped .... *G. Marionis.*
  - *β.* The crests on the inner surface of the palm are extremely prominent, the cutting edge of the dactylus is not quite straight and that of the immobile finger is scallopped into two large triangular lobes .... *G. Marionis*, var. *nitidus.*

- ii. The arm of the large male cheliped ends in a constricted lobe, but there is no sharp upstanding tooth inside it on the inner border:—
  - *a.* Front, measured as above, about a twelfth the greatest breadth of the carapace; the fingers of the large male cheliped have tips that suggest tongs, owing to the presence of an enlarged tooth near the tip: the meropodites of the last pair of legs are nearly as foliaceous as those of the preceding pair .... *G. acutus.*
  - *b.* Front, measured as above, not a fifteenth the greatest breadth of the carapace: the fingers of the large male cheliped end in simple hooked tips: the meropodites of the last pair of legs are not much broadened .... *G. Dussumieri.*

2. On the lower wall of the orbit, inside of and parallel with the middle third of the lower border of that cavity, is a raised row of granules .... *G. Urvillei.*

48. *Gelasimus annulipes*, Latr., Edw.

? *Cancer vocans minor*, Herbst, Krabben, I. ii. 81, pl. i. fig. 10.

Gelasimus annulipes, Milne Edwards, Hist. Nat. Crust. II. 55, pl. xviii. fig. 10–13; and Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 149, pl. iv. fig. 15: Dana, U. S. Expl. Exp., Crust., pt. I. p. 317: Heller, Novara Crust. p. 38: Hilgendorf, in v. d. Decken's Reis. Ost-Afr. III. i. p. 85, and MB. Ak. Berl. 1878, p. 803: Hoffmann, in Pollen and van Dam, Faun. Madagasc., Crust. p. 18: Kossmann, Reise roth.

Meer., Crust., p. 53: Miers, Phil. Trans. Roy. Soc. Vol. 168, 1879, p. 488, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 310, and Zool. H. M. S. Alert, pp. 518, 541, and Challenger Brachyura, p. 244: Richters, in Möbius Meeresf. Maurit., p. 155: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 148, pl. x. fig. 22: de Man, Notes Leyden Mus. II. 1880, p. 69, and Journ. Linn. Soc., Zool., XXII. 1887-88, p. 118 pl. viii. fig. 5–7, and Archiv f. Naturges. LIII. 1887, i. p. 353, and Notes Leyden Mus. XIII. 1891, pp. 23, 39, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 307, and Zool. Zahrb., Syst., VIII. 1894–95, p. 577: Lenz & Richters, Abh. Senck. Nat. Ges. Frankf., XII. 1881, p. 423: F. Muller, Verh. Ges. Basel. VIII. 1886, p. 475: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 388: Ortmann, Zool. Jahrb. Syst. VII. 1893–94, pp. 752, 758, and Jena. Denk. VIII. 1894, p. 57: Zehntner, Rev. Suisse de Zool. II. 1894, p. 178.

Gelasimus Carionis, Edw. (*nec* Desm.), Hist. Nat. Crust. II. 53.

Gelasimus porcellanus, White, P. Z. S. 1847, p. 85, and in Adams and White, Samarang Crust., p. 50: Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 151: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 155.

Gelasimus perplexus, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 150, pl. iv. fig. 18: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 274.

? *Gelasimus pulchellus*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, pp. 99, 100.

Uca annulipes, Ortmann, Zool. Jahrb. Syst. X. 1897–98, pp. 351 and 354: Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 274: Doflein, SB. Ak. Münch. XXIX. 1899, p. 193.

Length of the carapace about three-fifths of the greatest breadth at the acute claw-like antero-lateral angles. The posterior border of the dorsum of the carapace—*i.e.*, the border corresponding with the last segment of the sternum—is a good deal over half the greatest breadth of the carapace, so that the lateral borders of the dorsum of the carapace, which are distinctly defined in almost two-thirds of their extent by a fine raised line, are only moderately convergent. The post-gastric and cardiac regions are the only ones that are defined, and they but faintly.

Front, measured between the bases of the eyestalks, from a fifth to a sixth the greatest breadth of the carapace.

Orbits sinuous and considerably oblique; their upper border defined by a fine raised line which is very distinctly double in a good part of its extent; their lower border very elegantly and regularly serrated—the teeth increasing in size from within outwards. In the female only there is a short row of granules inside of and parallel with the lower border of the orbit.

In the large cheliped of the adult male the greatest length of the hand (including fingers) is at least three times the length of the carapace: the outer surface of the somewhat rounded arm and of the wrist and hand is smooth to the naked eye, with a few small granules on the inner border of the wrist: the lower border of the palm is obscurely marginate: and on the inner surface of the palm are two salient granular crests, one of these is deeply grooved and nearly vertical and becomes continuous with the dentary edge of the immobile finger, the other, which is the more prominent, is oblique and runs to the lower border of the same finger. In the adult male the fingers of the large hand are about twice the length of the upper border of the palm: they are not very broad, and owing to the hook-like curve of the dactylus there is a wide space between them when the tips are apposed: the immobile finger is but slightly curved, and is generally shorter than the dactylus, and owing to the presence of an enlarged tooth near the tip, the tip has a characteristic notched-truncate appearance.

The meropodite in the last pair of legs is not at all foliaceous.

The carapace in the adult male is about 11 millim. long and 19 millim. broad.

In the Indian Museum are 300 specimens from all parts of the coast from Karachi on the west to Mergui on the east.

This species is not, as Miers queries, the same as Stimpson's *G. splendidus*, of which we have numerous specimens from Hongkong.

49. *Gelasimus lacteus* (De Haan).

Ocypode (*Gelasimus*) *lactea*, De Haan, Faun. Japon., Crust., p. 54, pl. xv. fig. 5.

Gelasimus lacteus, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, pl. iv. fig. 16: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 100: Miers, P. Z. S. 1879, pp. 20, 36: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 149, pl. x. fig. 28: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 234: de Man, Notes Leyden Mus. XIII. 1891, p. 22: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, pp. 752, 759.

Uca lactea, Ortmann, Zool. Jahrb., Syst., X. 1897-98, pp. 351, 355.

Easily distinguished from *G. annulipes*, which is its nearest relative, by the following characters :—

(1) the carapace is much more nearly quadrangular, the posterior border of its dorsum being between three-fifths and two-thirds of its greatest breadth, and its true lateral borders being parallel, while the lateral borders of its dorsum are nearly so :

(2) in the larger cheliped of the male the outer end of the upper border of the arm, and the inner border of the wrist, are distinctly denticulated; the dactylus is not so strongly hooked, and the end of the immobile finger though obliquely truncate has an acuminate tip—never a notched-truncate tip:

(3) the colour, in spirit specimens, has a sort of livid bloom never seen in *G. annulipes*.

In the Indian Museum are 47 specimens from Karachi and 3 from the Andamans.

[*Gelasimus inversus*, Hoffmann.

Gelasimus inversus, Hoffmann, in Pollen and van Dam, Faun. Madagasc. Crust. p. 19, pl. iv. figs. 23-26 (1874): Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 155

de Man, Notes Leyden Mus. XIII. 1891, pp. 21, 44, pl. iv. fig. 12: Ortmann, Zool. Jahrb., Syst., VII. 1893–94, p. 751, and Jena. Denk. VIII. 1894, p. 59.

Gelasimus chlorophthalmus, Hilgendorf (*nec* Edw.), MB. Ak. Berl. 1878, p. 803 (*apud* de Man).

Gelasimus Smithii, Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 144, pl. 9, fig. 14 (*apud* Ortmann).

Uca inversa, Ortmann, Zool. Jahrb., Syst., X. 1897–98, p. 351.

There are in the Indian Museum specimens of this species from Madagascar and the Red Sea, and some from Karachi which differ from the type in the form of the dactylus of the large male cheliped, and are here separated as a variety.]

50. *Gelasimus inversus*, var. *sindensis*, nov.

This variety differs from typical *G. inversus* from Madagascar only in having the tip of the dactylus of the large male cheliped simple (instead of furnished with a second tooth that gives it a notched appearance) and the palm of the hand smoother externally.

The species resembles *G. annulipes*, from which it differs in the following characters:—

(1) the lateral borders of the dorsum of the carapace are defined by a fine line which is raised and distinct in the anterior third only, and is a little more oblique:

(2) the lower border of the orbit is much more sinuous, and is either entire or is quite imperceptibly denticulated at its outer angle:

(3) in the large cheliped of the male the arm is trigonal with sharp edges, the upper edge rising into a distinct lobe or crest and the distal end of the inner edge forming a crest or blunt tooth; the inner edge of the wrist is distinctly denticulated, and the upper border of the palm has several longitudinal rows of granules; of the granular ridges on the inner surface of the palm *the lower one that in* G. annulipes *runs to the lower edge of the immobile finger is absent or, at most, is represented by a smooth and slight swelling;* finally the immobile finger, though as in *G. annulipes* nearly straight and shorter than the dactylus, has a simple not a notch-like tip.

In the Indian Museum are 30 specimens from Karachi. The carapace of the largest specimen is 10 millim. long and 18 millim. broad.

51. *Gelasimus triangularis*, A. M. Edw.

Gelasimus triangularis, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 275: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 150: de Man, Journ. Linn. Soc., Zool., XXII. 1887–88, p. 119, pl. viii. figs. 8–11, and Notes Leyden Mus. XIII. 1891, p. 22, and in Weber's Zool. Ergebn. Niederl. Ost. Ind. II. 1892, p. 307: and Zool. Jahrb., Syst., VIII. 1894–95, p. 577: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 388.

Gelasimus perplexus, Heller (*nec* Edw.), Novara Crust. p. 38, pl. v. fig. 4.

?? *Gelasimus minor*, Owen, Zool. H. M. S. "Blossom," Crust., p. 79, pl. xxiv. figs. 2, 2*a* (1839): Milne Edwards, Ann. Sci. Nat., Zool., XVIII. 1852, p. 151: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 150.

Uca triangularis, Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 274.

Length of the carapace about four-sevenths of the greatest breadth, which is at the spine-like antero-lateral angles.

Carapace strongly convex, almost hexagonal, the regions not indicated. The posterior border of the dorsum of the carapace is less than half the greatest breadth, hence not only the lateral borders of the dorsum of the carapace, but also the true lateral borders, are strongly convergent posteriorly, the former being defined by a fine raised line in more than two-thirds of their extent.

Front, as in *G. annulipes*, from a fifth to a sixth the greatest breadth of the carapace.

Orbits sinuous, much oblique: the upper border defined by a fine microscopically-beaded line, which is double in great part; the lower microscopically beaded, serrulate at its outer end.

In the large cheliped of the adult male the hand is about $2\frac{1}{2}$ times as long as the carapace; the outer surface of the arm, wrist, and hand are smooth to the naked eye; all the borders of the arm are sharply defined and finely serrulate, the inner border of the wrist is finely serrulate, and the upper and lower borders of the palm are marginate and granulate, especially the upper border; and the two oblique granular crests on the inner surface of the arm are in strong relief.

In the large hand the dactylus, in the adult, is from $1\frac{1}{2}$ to $1\frac{3}{4}$ times the length of the upper border of the palm; its tip is simply hooked and overhangs the simple upcurved tip of the immobile finger.

The meropodite of the last pair of legs is not nearly so broad as that of the two preceding pairs.

In the Indian Museum are 70 specimens, all but one being from various parts of the Bay of Bengal littoral. The carapace of a large specimen is 10 millim. long and about 18 millim. broad.

The figures of *G. minor*, Owen, agree very well with this species, and if the two names should prove to refer to the same species this name has the precedence.

52. *Gelasimus tetragonum* (Herbst).*

Cancer marinus, minor, vociferans, Seba, Thesaurus, III. p. 48, pl. xix. fig. 15.

Cancer tetragonon, Herbst, Krabben, I. ii. 257, pl. xx. fig. 110, and III. i. 31.

Gelasimus tetragonum, Rüppell, 24 Krab. roth. Meer., p. 25, pl. v. fig. 5: Milne

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* I assume that Herbst used *tetragonon* as a noun substantive in apposition to *Cancer*; it may therefore continue in apposition to *Gelasimos* used as a substantive.

Edwards, Hist. Nat. Crust. II. 52, and Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 147, pl. iii. fig. 9: Guérin, Voy. Coquille, II. Zool., Crust. p. 10, pl. i. figs. 2, 3: A. Milne Edwards, in Maillard's l'ile Réunion, Ann. F., p. 6, and Nouv. Archiv. du Mus. IX. 1873, p. 273: Heller, Novara Crust., p. 37: Hilgendorf, in v. d. Decken's Reisen Ost-Afr. Crust. p. 84: Hoffmann, in Pollen and Van Dam, Faun. Madag. Crust. p. 16: Kossmann, Reis. roth. Meer. Crust. p. 52: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 143, pl. ix. fig. 11: de Man, Archiv f. Naturges. LIII. 1887, i. p. 353, and Notes Leyden Mus. XIII. 1891, pp. 20, 24, pl. ii. fig. 6: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, pp. 750, 754: Whitelegge, Mem. Austral. Mus. III. 1897, p. 138.

Gelasimus Duperreyi, Guérin, Dana U. S. Expl. Exp. Crust. pt. i. p. 317.

Uca tetragona, Ortmann, Zool. Jahrb., Syst. X. 1897–98, p. 348: Doflein SB. Ak. Münch. XXIX. 1899, p. 193.

Length of the carapace about two-thirds of its greatest breadth at the acute antero-lateral angles. Carapace somewhat pentagonal, markedly convex fore and aft, the regions all recognizable but not strongly defined: though the posterior border of its dorsum is only half its greatest breadth, the true lateral borders are but slightly convergent posteriorly. In the adult male the fine raised line that bounds the dorsal plane on each side is distinct as such only in the neighbourhood of the antero-lateral angles, but in the female it runs much further backwards.

The breadth of the front, measured between the bases of the eyestalks, is about a tenth the greatest breadth of the carapace.

Orbits much oblique, both borders sinuous, the lower border elegantly denticulated throughout.

In the large cheliped of the adult male the upper border of the arm is fairly prominent and the inner border ends in a sharp tooth, quite independent of the constricted-off terminal lobule; the wrist is quite smooth to the naked eye, and has the inner angle sharp but not spiniform; and the hand is about $2\frac{1}{2}$ times the greatest length of the carapace.

In the hand of this cheliped the palm is, to the naked eye, frosted with very fine granules, some of which in the neighbourhood of a scar near the base of the immobile finger are visible to the naked eye; its upper border is not, and its lower border is but obscurely, defined; and the two oblique crests on its inner surface are mere swellings, often quite faint, and never strongly salient. The fingers are neither broad nor particularly thin: the dactylus, which is about $1\frac{2}{3}$ times the length of the upper border of the palm, tapers and is somewhat hooked at tip; the immobile finger commonly has two teeth a little enlarged, the second one being near the tip and sometimes giving the tip a somewhat notched (but not truncated) appearance.

The merus of the last pair of legs is not at all foliaceous.

In the Indian Museum are 29 specimens from the Andamans: the carapace of a large one is 17 millim. long and 26 millim. broad.

The "Challenger" specimens referred by Miers to this species have a broad front and are identical with specimens from Hongkong that I take to be *G. splendidus.*

53. *Gelasimus Marionis*, Desm.

Gelasimus Marionis, Desmarest, Consid. Gen. Crust., p. 124, pl. xiii. fig. 1, and Dict. Sci. Nat. XXVIII. 1823, p. 243: Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 145, pl. iii. fig. 5 (*nec* Hist. Nat. Crust. II. 53): de Man, Notes Leyden Mus. II. 1880, p. 67: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 308: Kingsley, Proc. Ac. Nat. Sci. Philad. XXXII. 1880, p. 141, pl. ix. fig. 8.

Gelasimus cultrimanus, White, P. Z. S. 1847, p. 205, Ann. Mag. Nat. Hist. XX. 1847, p. 205, and Samarang Crust. p. 49 (*apud* Miers *loc. cit. supra*).

Gelasimus cultrimanus var. *Marionis*, Ortmann, Zool. Jahrb. Syst. VII. 1893-94, pp. 750, 754.

Length of the carapace about two-thirds of the greatest breadth, which is at the claw-like antero-lateral angles.

Carapace little convex, all its regions very well defined, the posterior border of its dorsum in the adult male is half its greatest breadth and the true lateral borders are moderately convergent posteriorly: the fine raised line that in some other species defines the greater part of the dorsal plane is here, in the adult male, confined to the neighbourhood of the antero-lateral angles.

The breadth of the front between the bases of the eyestalks is not a fifteenth the greatest breadth of the carapace.

Orbits not very oblique nor very sinuous; the lower border, which is nearly straight, is elegantly crenulate throughout.

In the large cheliped of the adult male the upper border of the arm is prominent and the inner border ends in a sharp tooth, independent of the terminal constricted-off lobule; the upper surface of the wrist is granular, and the inner border of the wrist has a denticle or spinule at its angle; and the hand (fingers included) is about three times the length of the carapace.

This large hand has a curious twist: its palm is compressed and has the upper and lower margins well defined, the outer surface covered with large granules, and the two granular crests on its inner surface fairly prominent: its fingers are broad thin and laminar; the dactylus, which may be four times as long as the upper border of the palm, is shaped like a knife-blade; and in the immobile finger, which has a groove or line of pits along its outer surface, the dentary edge has a simple S-shaped curve.

The merus of the last pair of legs is not at all foliaceous.

In the Indian Museum are 9 specimens from the Andamans. The carapace of a large specimen is 18·5 millim. long and 26·5 millim. broad.

54. *Gelasimus Marionis* var. *nitidus*, Dana.

Gelasimus vocans, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 145, pl. iii. fig. 4 (*nec* Hist. Nat. Crust. II. 54): Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 99: Heller, Novara Crust. p. 37: Hilgendorf, in v. d. Decken's Reis. Ost-Afr., p. 83: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 272: Hoffmann, in Pollen and Van Dam's Faun. Madagasc. Crust. p. 16: Miers, Phil. Trans. Roy. Soc. Vol. 168, 1879, p. 488, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 308, and Challenger Brachyura, p. 242: Richters, in Mobius, Meeresf. Maurit. p. 155: de Man, Notes Leyden Mus. II. 1880, p. 67, and XIII. 1891, p. 23, pl ii. fig. 5, and Archiv f. Naturges. LIII. 1887, i. p. 352, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 305, and Zool. Jahrb. Syst. VIII. 1894–95, p. 572: Haswell, Cat. Austral. Crust. p. 92.

Gelasimus nitidus, Dana, U. S. Expl. Exp. Crust. pt. I. p. 316, pl. xix. figs. *5a-d*: Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 147: Thallwitz, Abh. Mus. Dresden, 1890–91, p. 42.

Gelasimus cultrimanus, Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 140, pl. ix. fig. 7: Ortmann, Zool. Jahrb., Syst., VII. 1893–94, pp. 750-753, and Jena. Denk. VIII. 1894, p. 56.

Uca cultrimana, Ortmann, Zool. Jahrb., Syst. X. 1897–98, p. 348.

Differs from *G. Marionis* only in the form of the large hand of the adult male: this member, in var. *nitidus*,

(1) is not much over $2\frac{1}{2}$ times the length of the carapace, its dactylus being but little more than twice the length of the upper border of the palm:

(2) it has the two oblique granular ridges on the inner surface of the palm remarkably salient:

(3) it has the dentary edge of the immobile finger thrown into a characteristic W-shaped curve owing to the strong projection of two large triangular lobes, and

(4) it has the dactylus somewhat hooked at tip.

In the Indian Museum are 103 specimens, chiefly from the Andamans and Nicobars, but also from the Coromandel and Malabar coasts. The length of the carapace in large specimens is 14 millim., the breadth 21 millim.

55. *Gelasimus acutus*, Stimpson, de Man.

Gelasimus acutus, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 99: Tozzetti, Magenta Crust. p. 107: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 144: de Man, Journ. Linn. Soc., Zool. XXII. 1887–88, p. 113, pl. vii. figs. 8-9, pl. viii. figs. 1–4, and Notes Leyden Mus. XIII. 1891, p. 21, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 306, and Zool. Jahrb. Syst. VIII. 1894–95, p. 573: Ortmann, Zool. Jahrb., Syst. 1893–94, p. 750.

Uca acuta, Doflein, SB. Ak. Münch. XXIX. 1899, p. 193.

Length of the carapace about three-fifths the greatest breadth, which is at the acute wing-like antero-lateral angles.

Carapace strongly convex fore and aft, the regions moderately well defined: its lateral borders are strongly convergent, and still more so are the lateral borders of the dorsal plane, which are defined in more than two-thirds of their extent by a fine raised line: the posterior border of the dorsal plane is contained from 2½ to 2¼ times in the geatest breadth.

Front, measured between the eye-stalks, about a twelfth the greatest breadth of the carapace, its moulded and bevelled edges do not together take up half its breadth.

Orbits moderately oblique, both upper and lower borders much sinuous; the lower border finely, the upper border still more finely and more distantly crenulate.

In the large cheliped of the adult male all three borders of the arm are well defined, the inner and the lower borders being crenulated, but the inner border having no tooth independent of the terminal constricted-off lobule; the upper surface of the wrist and the outer surface of the palm are closely covered with vesiculous granules; and the hand (fingers included) may be 3½ times the length of the carapace.

In this large hand the upper and lower borders of the palm are well defined, and of the two oblique granular crests on the inner surface of the palm the upper one that runs to the dentary edge of the immobile finger is short and indistinct: the fingers are not particularly broad or thin, and however the teeth may be disposed, there is always one near the end of each finger that is enlarged so as to give the ends of the fingers, when apposed, a sort of tongs-like or forceps-like grip: the dactylus is from 2 to nearly 2⅔ times the length of the upper border of the palm.

The merus of the last pair of legs is distinctly foliaceous.

In the Indian Museum are 92 specimens chiefly from the Sunderbunds and Mergui, but also from Karachi and the Andamans. In a large specimen the carapace is 14 millim. long and 25 broad.

56. *Gelasimus Dussumieri*, Edw.

Gelasimus Dussumieri, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII. 1852, p. 148, pl. iv. fig. 12: A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71, and IX. 1873, p. 274: Hoffmann in Pollen and van Dam's Faun. Madag. Crust. p. 17, pl. iii. figs. 19–22: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 145, pl. x. fig. 16: de Man, Notes Leyden Mus. II. 1880, p. 68, and XIII. 1891, pp. 20, 26, and Journ. Linn. Soc. Zool. XXII. 1887–88, p. 108, pl. vii. figs. 2–7, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 306, and Zool. Jahrb., Syst., VIII. 1894–95, p. 576: Lenz and Richters, Abh. Senck. Nat. Ges. Frankf. XII. 1881, p. 423: Haswell, Cat. Austral. Crust. p. 93: Miers, Zool. H. M. S. Alert, pp. 518, 541: Ortmann, Zool. Jahrb. Syst. VII. 1893–94, pp. 750, 755.

Gelasimus longidigitum, Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 144, pl. ix. figs. 10, 13 (*fide* Ortmann *l. c. infra*).

Uca Dussumieri, Ortmann, Zool. Jahrb., Syst., X. 1897–98, p. 348: Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 273: Doflein, SB. Ak. Münch. XXIX. 1899, p. 193.

Closely related to *G. acutus*, from which it can be distinguished by the following characters when fully adult males are compared:—

(1) the regions of the carapace are much more strongly defined, and the raised lines that bound the dorsal plane of the carapace on each side are more curved, less rapidly convergent, and less distinct in their posterior part, which gives the carapace a much less posteriorly-contracted look; and the orbits are less oblique:

(2) the front, measured between the bases of the eyestalks, is about a fifteenth the greatest breadth of the carapace, and its moulded and bevelled edges together take up more than two-thirds of its breadth:

(3) in the large cheliped the arm is longer and more slender, both the oblique granular ridges on the inner surface of the palm are very strongly defined, and the fingers may be fully 3 times the length of the upper border of the palm:

(4) these large fingers are broader and thinner, their tips are somewhat hooked and have no enlarged tooth near them, but near the middle of the immobile finger there is a enlarged tooth or triangular lobe:

(5) the merus of the last pair of legs, though it is compressed and somewhat broadened, is not a short foliaceous joint.

In the Indian Museum are 52 specimens, from Mergui, Andamans and Nicobars, and Bimlipatam.

57. *Gelasimus Urvillei*, Edw.

Gelasimus Urvillei, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 148, pl. iii. fig. 10: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 145, pl. ix. fig. 15: de Man, Notes Leyden Mus. XIII. 1891, pp. 21, 34: Ortmann, Zool. Jahrb., Syst., VII. 1893–94, p. 750.

Gelasimus Dussumieri, Hilgendorf (*nec* Edw.), in v. d. Decken's Reis. Ost-Afr. Crust. p. 84, pl. iv. fig. 1.

This species closely resembles *G. acutus* and *G. Dussumieri*, but is distinguished from both by the presence of a raised row of granules behind and parallel with the middle third of the lower border of the orbit—*i.e.*, just inside the orbital cavity.

As in *G. acutus*, the fine raised lines that define the dorsal plane of the carapace laterally are distinct throughout and rapidly convergent, which gives the carapace a look of breadth in front and of unusual narrowness behind; and, as in *G. acutus*, the meropodites of the last pair of legs are, even in the male, decidedly shortened and foliaceous joints.

On the other hand the front is, as in *G. Dussumieri*, extremely narrow, and its bevelled and moulded edges take up most of its breadth between the eye-stalks. The regions of the carapace, also, are as strongly defined as they are in *G. Dussumieri*.

The large hand of the male resembles that of *G. Dussumieri* in having both the oblique granular ridges on the inner surface of the palm strongly salient, and in having very long fingers with simple hooked tips: the fingers however are not so broad and thin, and the lobe near the middle of the dentary edge of the immobile finger may be present or not.

In the Indian Museum are 10 specimens, from Karachi, Madras, and the Nicobars.

The carapace of the largest specimen is 20 millim. long and 36 millim. broad.

Subfamily SCOPIMERINÆ.

DOTILLA, De Haan, Stimpson.

Doto, De Haan, Faun. Japon. Crust. p. 24 (1835) *nom. præoc.*: Milne Edwards, Hist. Nat. Crust. II. 38, and Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 152.

Dotilla, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 98.

Cephalothorax so deep as to be subcubical, as long as broad or a little broader than long. Anteriorly the sidewalls of the carapace have a curious gyrous-sulcate sculpture resembling brain-convolutions: often also a similar kind of sculpture is found on the dorsum of the carapace and on the meropodites of the external maxillipeds.

Front a narrow deflexed lobe much as in *Ocypoda*. The orbits, which occupy all the rest of the anterior border of the carapace, are more or less oblique and shallow—in one species so shallow as to be almost obsolete. Eyestalks rather long and slender, with the eyes at the end.

Antennules, like those of *Ocypoda*, having the basal joint of good size, and the flagellum small and hidden by the front. The antennæ stand at the inner angle of the lower orbital border and have a rather short flagellum.

The epistome would be linear but for a large median triangular lobe that projects between the external maxillipeds.

Buccal cavern enormous, suboval or subcircular in outline: the external maxillipeds, which completely cover it and are also very large, have a strong almost hemispherical bulge; their merus is much larger than the ischium and carries the flagellum at the antero-external angle: the exognath is extremely slender and inconspicuous.

Chelipeds equal, stouter than the legs: fingers usually slender and a little deflexed, usually without conspicuous teeth.

Legs not much differing in length, which is moderate: their meri (as also those of the chelipeds) have on the upper surface a curious membranous area or "tympanum." Similar "tympana" may also be present on some of the segments of the sternum.

The abdomen in the male consists of 7 separate segments, and though narrow is nowhere linear or compressed: the distal end of the fourth segment is thickly fringed with bristles, and overlaps and partly conceals the fifth tergum. In the female, according to De Haan, the abdomen consists of 5 separate segments.

Distribution: Tropical shores and mud-flats, from East Africa and the Red Sea eastwards to Japan. Found in the same situations as *Gelasimus* and *Ocypoda*.

Key to the Indian species of Dotilla.

- I. Carapace broader than long: chelipeds not much longer than the carapace, and not much differing from the legs in point of length: no "tympana" on the sternum:—
  - 1. Meropodites of legs not dilated: fingers of chelæ slender, without any conspicuous teeth:—
    - i. Whole surface of merus of external maxillipeds gyrous-sulcate: fingers not longer than palm.................................. *D. affinis.*
    - ii. Only the outer-half of the merus of the external maxillipeds is gyrous-sulcate:—
      - *a.* Fingers slightly longer than the palm....................................... *D. Blanfordi.*
      - *b.* Fingers more than twice as long as the palm .... *D. intermedia.*
  - 2. Meropodites of the legs dilated:—
    - i. Fingers of chelæ without any conspicuous tooth: dactyli of the legs, even of the last pair, shorter than the propodites...... *D. brevitarsis.*
    - ii. A large tooth on each finger of the chelæ, arranged so that when the tips of the fingers are closed these large teeth meet, and an hour-glass-shaped space is left between the closed fingers: dactyli of the legs longer than the propodites............. *D. clepsydrodactylus.*
- II. Carapace at least as long as broad: chelipeds 3 or 4 times as long as the carapace, and much longer than the legs: "tympana" present on the sternum......... *D. myctiroides.*

58. *Dotilla affinis*, n. sp.

Differs from *D. sulcata*, with specimens of which, from the Red Sea, I have compared it, only in the following characters:—

(1) there is no spine on the under surface of the arm, (2) the fingers are not so long as the palm, (3) there is a small tympanum on the dorsal surface of the merus of the last pair of legs, whereas in *D. sulcata* only the tympanum on the ventral surface is present.

The carapace behind the gastric and inside the branchial regions, forms a smooth semicircular facet, but all its anterior and lateral regions have a curiously convoluted sculpture, the convexities of the convolutions being finely granular.

The grooves that define these convolutions form, when viewed as a whole, a sort of five-rayed star, the anterior ray (which runs up between the eyes on to the front) being the shortest, the antero-lateral rays (which run towards the outer angles of the orbit) being a little longer, and the postero-lateral rays (which really are triple) being the longest of all.

The pterygostomian regions and neighbouring part of the side-walls of the carapace, and the meropodites of the external maxillipeds have the same curious convoluted sculpture. The orbits are shallow but are perfectly defined.

The merus of the external maxillipeds is more than twice the size of the ischium.

Chelipeds (measured round their curve) not twice the length of the carapace: no spine on any of their segments: fingers not so long as the palm.

Legs slightly longer than the chelipeds, their meropodites not at all broadened but all having a "tympanum": except in the case of the last pair of legs—in which the dactylus is remarkably long—the dactyli are rather shorter than the propodites.

No tympana on the sternum.

In the Indian Museum are 4 specimens from Aden and the Baluchistan coast. The carapace of the largest is 5·3 millim. long and 7·3 millim. broad.

59. *Dotilla intermedia*, de Man.

Dotilla intermedia, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 135, pl. ix. figs. 4–6 (1888).

Carapace sculptured in much the same way as in *D. affinis*, only the grooves are not so deep and distinct, and there is an additional groove running parallel with the posterior margin.

The merus of the external maxillipeds is not twice as large as the ischium, and the sculpturing consists of a single loop parallel with the outer border of the merus, the inner half of that joint being quite smooth.

Fingers more than twice as long as the palm. In the last pair of legs the dactylus is about twice as long as the propodite: in all the other legs the dactyli are very little longer than the propodites.

In other respects this species agrees with *D. affinis.*

In the Indian Museum are 15 specimens from Mergui. The carapace is 4 millim. long and a little over 4 millim. broad.

60. *Dotilla Blanfordi*, n. sp.

The whole of the dorsal surface of the carapace is areolated and grooved (the areolæ being finely granular and the grooves smooth) as follows:—

A very distinct groove runs parallel with either lateral border, and a scarcely less distinct one runs parallel with the posterior border, and in the space bounded by these grooves a six-rayed star of grooves of nearly equal length can be made out. This "star" is formed by a groove running fore and aft down the middle of the carapace and having, on either side of it, a semicircular chord joining the outer angle of the orbit with a point near the postero-lateral angle of the carapace. The intersection of these grooves cuts the post-gastric subregion into 4 symmetrical tubercles.

The whole side-wall of the carapace is finely granular, and the subhepatic and pterygostomian regions have the characteristic convoluted sculpture. The orbits are shallow but are perfect.

The external maxillipeds are finely granular: the merus is twice as big as the ischium, and its sculpture consists of a single loop parallel with the outer border and a single groove parallel with the inner border.

Chelipeds as in *D. affinis*, except that the fingers are a little longer than the palm.

Legs as in *D. affinis*, the meropodites being slender and all having a "tympanum," but in the last pair the dactylus is about twice as long as the propodite, and in the other pairs the dactyli are very slightly longer than the propodites. No sternal tympana.

In the Indian Museum are 4 specimens from the coast of Sind and Baluchistan. The carapace of the type is a little over 5 millim. long and not quite 7 millim. broad. Collected by Mr. W. T. Blanford, F.R.S.

61. *Dotilla clepsydrodactylus*, n. sp.

Near *D. Wichmanni*, de Man.

The sculpture of the dorsum of the carapace is like that of *D. Blanfordi*, only the grooves are much deeper cut and the groove between the post-gastric region and the postero-lateral angle of the carapace is double: the sculpture of the sidewall of the carapace is like that of *D. Blanfordi.*

In the external maxillipeds the merus is not twice as big as the ischium, and its sculpture consists of a single simple convolution parallel with the outer border, the inner half of its surface being quite smooth—as is *D. intermedia.*

The orbits are shallow but are quite perfect.

The chelipeds, measured all round their curve, are not twice the length of the carapace and have no spine on the arm. The fingers are much longer than the palm: *in the adult male they are extremely slender, and each has a large tooth arranged so that when the tips of the fingers are closely apposed these two teeth meet and leave an hour-glass-shaped space between the closed fingers.*

Legs a little longer than the chelipeds; their meropodites are slightly but distinctly dilated and all have a *tympanum:* their dactyli are all longer than their propodites, and in the last pair the dactylus is very long, slender, straight, and fluted. No sternal tympana.

Colours, speckled like the sand in which they live.

In the Indian Museum are eight specimens from False Point on the sea face of the Mahanaddi Delta. The carapace of the largest is 5 millim. long and 6 millim. broad.

62. *Dotilla brevitarsis*, de Man.

Dotilla brevitarsis, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 130, pl. ix. figs. 1-3 (1888).

The whole carapace is grooved and areolated (but the sculpture is not very deep) as follows:—

A strong groove runs fore and aft down the middle of the carapace, another runs parallel with the posterior border, and on each side another takes a sinuous course along each lateral border: other short and rather indefinite grooves join the median and lateral grooves.

The subhepatic and pterygostomian regions have the usual convoluted sculpture. Orbits shallow, but distinct.

The merus of the external maxillipeds is much larger than the ischium: its whole surface is sculptured, the sculpture taking the form of a W-shaped convolution.

Chelipeds short, without any spine on the arm: palm short, high, and compressed, with sharp edges, traversed by a fine raised line near and parallel with the lower border: fingers thin and compressed, about as long as the palm, the upper edge of the dactylus—like that of the palm—fringed with hair.

Legs a little longer than the chelipeds, the meropodites—especially of the first 3 pairs—*much broadened and compressed*, all having a tympanum. *The dactyli, even of the last pair of legs, are shorter than the propodites.*

No tympana on the sternum.

In the Indian Museum are fragments of 3 specimens from Mergui: de Man states that the breadth of the cephalothorax of the largest specimen is nearly 10 millim.

63. *Dotilla myctiroides*, Edw.

Doto myctiroides, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII. 1852, pl. iv. fig. 24.

Dotilla myctiroides, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 98: A. O. Walker, Journ. Linn. Soc. Zool. XX. p. 111: Aurivillius, Zur Biologie amphibischer Dekapoden, p. 5, pl. i. figs. 1–13, pl. iii. fig. 13, (Mitg. Ges. Wiss. Upsala, 1893).

Scopimera myctiroides, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 390.

Carapace about as long as, or slightly longer than, broad, little sculptured dorsally, though its antero-lateral parts are studded with vesiculous granules. Front grooved: a groove runs parallel with either lateral border, and a faint groove crosses either postero-lateral angle. The side-walls anteriorly have the usual "brain-convolution" sculpture.

Orbits very oblique and very shallow, almost obsolete.

The merus of the external maxillipeds is nearly twice as big as the ischium and is finely granular; a single faint groove, most distinct anteriorly, runs parallel with its outer border.

Chelipeds between three and four times the length of the carapace, all the joints long, slender, and unarmed: fingers longer than the palm, without any conspicuous teeth.

Legs long, but much shorter than the chelipeds: the meropodites strongly dilated, and with a large "tympanum": the dactylus of the last pair is longer than the propodite, but in the other three pairs it is a little shorter than the propodite.

On either side of each of the last four thoracic sterna is a large tympanum.

In the Indian Museum are 19 specimens from the Andamans and 11 from the Coromandel coast. The carapace is 10 millim. long.

SCOPIMERA, De Haan.

Scopimera, De Haan, Faun. Japon. Crust., p. 24 (1835): Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 153.

Scopimera has the same deep "cubical" carapace and the same general facies as *Dotilla*, but differs in the following characters:—

The carapace is much broader than long and has none of the curious sculpture, resembling brain convolutions, that is found, at any rate on the sidewalls, in *Dotilla*: the external maxillipeds are unsculptured and their merus, though large, is smaller than their ischium: the abdomen of the male has a curious wasp-like form owing to the length and narrowness of its fifth segment, which segment may even become elongate-linear by constriction; it has no bristles either on the 4th tergum or elsewhere: in the female the abdomen consists of 7 separate segments.

Distribution: Indo-Pacific shores, from Karachi to Japan.

Key to the Indian species of Scopimera.

I. Chelipeds and legs with a reticulate or subsquamiform granulation, the chelipeds in the male about twice the length of the carapace: most of the tympana on the legs are traversed by a longitudinal ridge: fifth abdominal tergum of male long and narrow, but not linear.. *S. investigatoris.*

II. Chelipeds and legs finely and uniformly granular, the chelipeds in the male nearer 3 times than twice the length of the carapace: the tympana not subdivided by a ridge: the fifth abdominal tergum of the male is long and linear.. *S. crabricauda.*

According to F. Müller, *S. globosa*, De Haan, is found in Indian waters. The form of the abdomen in this species is similar to that of *S. investigatoris*, but the carapace is smooth, and the tympana of the legs are different.

64. *Scopimera investigatoris*, n. sp.

Carapace much broader than long, decidedly pentagonal, without distinction of regions, smooth except anteriorly and laterally where there are numerous irregularly-scattered granules: the sidewalls and pterygostomian regions finely granular.

Orbits broad as in *Ocypoda*, shallow, the upper border very oblique, the lower border finely denticulated and very prominent as in *Gelasimus*.

External maxillipeds with some obsolescent granulation. Chelipeds and legs finely granular in a somewhat reticulate or subsquamiform way.

Chelipeds about twice as long as the carapace: tympanum on the inner surface of the arm large, that on the outer surface of the arm small: fingers about as long as the palm, without any enlarged teeth.

First 3 pairs of legs about the same length as the chelipeds, the 4th pair shorter: the merus of all much dilated and with large well-defined tympana, all of which, except only the one on the dorsal surface of the last pair, are longitudinally subdivided by a fine ridge: the dactylus in the first 3 pairs is about the same length as the propodite, but in the last pair is considerably longer.

In the male abdomen the first 2 segments are horizontal-linear, the 3rd and 4th, though distinct, form a "butterfly" plate, the 5th is long and narrow and longitudinally grooved and gradually expands to meet the 6th, which is long and broad, while the 7th is transversely oval.

In the female the abdomen is of the usual shape, but in its broadest part is little more than half the breadth of the sternum.

In the Indian Museum are 11 specimens, from Diamond Island off C. Negrais in Burma. The carapace of the largest male is 4·5 millim. long and 7 millim. broad.

65. *Scopimera crabricauda*, n. sp.

Carapace subpentagonal, the regions indistinctly indicated, the surface of the mid-dorsal region is symmetrically puckered or vesiculous; the sidewalls and pterygostomian regions granular.

Orbits moderately broad and deep, the upper border oblique, the lower border prominent and finely denticulate.

External maxillipeds smooth: chelipeds and legs "frosted" under the lens.

In the male the chelipeds are more than 2½ times the length of the carapace and are longer and much stouter than the legs: there is a large tympanum on the inner surface of the arm, and a very small one on the outer surface: the dactylus is a little shorter than the palm and has one large tooth. In the female the chelipeds are shorter and not much stouter than the legs: the fingers are shorter than the palm, and the dactylus has no large tooth.

The meropodites of the legs are much dilated: all have tympana but these are not subdivided by any ridge: in the first 3 pairs of legs the dactyli are a little longer, in the fourth pair considerably longer, than the propodites.

In the male abdomen the first 2 segments are linear-horizontal and concealed, the 3rd and 4th form a triangular plate deeply grooved down the middle line, the 5th is long linear and grooved, the 6th and 7th, though separate, together form a racket-head.

In the female the abdomen is of normal shape.

In the Indian Museum are a male and female from Karachi. The carapace of the male is 6·5 millim. long and barely 10 millim. broad.

TYMPANOMERUS, de Man, Rathbun.

Dioxippe, de Man, Journ. Linn. Soc., Zool., XXII. 1887–88, p. 137 (1888): *nom. præocc.*

Tympanomerus, Rathbun, Proc. Biol. Soc., Washington, XI. 1897, p. 164.

Carapace deep, quadrilateral, broader than long, the regions not defined. Front narrow, deflexed: the orbits are trenches occupying the whole anterior border of the carapace between the front and the antero-lateral angles.

Eyes, antennules, antennæ and epistome as in *Dotilla*. Buccal cavern large, a little narrowed and rounded anteriorly: the external maxillipeds completely close the buccal cavern, the anterior outer corner of the ischium is marked off as a distinct facet as in *Dotilla* and *Scopimera*, the merus is much larger than the ischium, the palp arises near the antero-external angle of the merus, and the exognath is small and linear.

Chelipeds in both sexes stouter, and in the male longer, than the legs: fingers a little deflexed.

Legs rather compressed, the two middle pairs a little longer than the first and last pair: there are ill-defined tympana on the meropodites.

The abdomen in both sexes consists of separate segments, and in the male is narrow.

Distribution: Japanese and Andaman Seas.

The name *Tympanomerus* is a most unfortunate one, since the "tympana," compared with those of *Dotilla* and *Scopimera*, are ill-defined and inconspicuous.

66. *Tympanomerus orientalis* (de Man).

Dioxippe orientalis, de Man, Journ. Linn. Soc. Zool. XXII. 1887–88, p. 138, pl. ix. figs. 8–10.

Carapace square-cut, the length about four-fifths of the greatest breadth, dorsally nearly flat with the lateral borders well defined especially anteriorly, the surface a little lumpy in places: a perfectly straight fine transverse ridge runs close to and parallel with the posterior border.

Front grooved dorsally, hardly a fourth the breadth of the carapace. The outer angle of the lower border of the orbit forms a prominent tooth. The merus of the external maxillipeds is grooved along the outer border.

Chelipeds in the male nearly three times the length of the carapace: wrist elongate, somewhat cuboid, with a strong laterally-compressed lobe or tooth at its inner angle: palm rather high, both borders marginate and a second fine ridge runs close to and parallel with the lower border: fingers a little shorter than the palm, finely denticulate.

In the female the chelipeds are not twice the length of the carapace, the wrist is not elongate, though the tooth at its inner angle is present, and the fingers are a little longer than the palm.

The meropodites of the legs are slightly dilated, the dactyli are shorter than the propodites, and the carpopodites and propodites of the first two pairs are densely tomentose.

The fifth abdominal tergum of the male, though not particularly elongate, is a little constricted at base.

In the Indian Museum are 6 specimens from Mergui. The carapace of the largest is 4 millim. long and 5 millim. broad.

Subfamily MACROPHTHALMINÆ, Dana.

CLISTOSTOMA, De Haan restr.

Cleistostoma (= *dilata* nec *pusilla*) De Haan, Faun. Japon. Crust. p. 26: Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 160.

Carapace of no great depth, broader than long, its sides slightly arched, its regions ill-defined.

Front of moderate breadth, more than a fourth the greatest breadth of the carapace, declivous: orbits well defined, of good depth, occupying all the rest of the anterior border of the carapace: eyestalks stout, eyes terminal. The antennules fold obliquely: the antennæ are small and stand in the inner orbital hiatus.

Epistome well defined, very short fore and aft, with a prominent lobe or tooth in the middle line projecting between the external maxillipeds.

Buccal cavern squarish, but with the sides a little arched, completely closed by the external maxillipeds. These are large, and have the inner angle of the ischium strongly produced, the merus as large as or larger than the ischium, and the palp articulating at the antero-external angle of the merus: the carpus is ovate, but the two terminal joints are very short and slender: the exognath is in great part concealed.

Chelipeds in the female shorter and slenderer than any of the legs, in form exactly like those of the female of *Gelasimus*.

Of the legs the first two pairs are the shortest and slenderest, while the middle two pairs are much the largest and have very broad meropodites. There are no "tympana."

The abdomen of the female consists of 7 separate segments, and is very broad.

67. *Clistostoma dotilliforme*, n. sp.

Carapace rather depressed, slightly convex, smooth, with the regions ill-defined; its lateral borders are slightly arched and are finely serrated anteriorly behind the acute, almost dentiform, antero-lateral angles. Front between a third and a fourth the greatest breadth of the carapace, concave in the middle line. Upper border of the orbit sinuous, lower border prominent and finely serrated.

Merus of the external maxillipeds larger than the ischium, sculptured (somewhat as in the *Dotillæ*) with a sort of Y-shaped sulcus starting from the antero-external angle. The pterygostomian regions also are sculptured with branching or convoluted grooves much as in the *Dotillæ*.

The second and third pair of legs, which are much longer than the other two pair, are a little over 1½ times the length of the carapace and have an almost foliaceous meropodite with the anterior border finely serrulate and the posterior border elegantly spinate: the anterior border of the carpus and propodite of the second and third pair of legs is tomentose.

A single egg-laden female is in the Indian Museum: it was found at Karachi, and its carapace is 7 millim. long and 9 millim. broad.

TYLODIPLAX, de Man.

Tylodiplax, de Man, Zool. Jahrb., Syst. VIII. 1894–95, p. 593 (1895).

Carapace deepish, quite flat dorsally, broader than long and broader behind than in front, the lateral borders being posteriorly divergent and having a distinctly convex curve, the regions more or less defined.

Front between a third and a fourth the greatest breadth of the carapace, not deflexed, grooved longitudinally. The orbits occupy the rest of the anterior border of the carapace, but as the extent of this border is a good deal less than the greatest breadth of the carapace, and as the front is broad, the orbits have not the same elongate form as they have in most species of *Macrophthalmus*, though otherwise similar. Antennules and antennæ as in *Macrophthalmus*. *Eyes small, not terminal on the eyestalks.*

The epistome would be linear, were it not for a septum-like fold or lobe that projects strongly between the meropodites of the external maxillipeds: owing to this fold the anterior edge of the buccal cavern has a bilobed appearance. The external maxillipeds completely close the buccal cavern: their merus is at least as long as and decidedly broader than their ischium: the flagellum, which is slender, is articulated near, but not at, the antero-external angle of the merus: the exognath is not much concealed, though not completely exposed.

The chelipeds in the adult male are unknown: in the young male they are equal and are shorter and slenderer than the legs, except perhaps the very small 4th pair.

The legs have somewhat the same relations as in *Macrophthalmus*—*i.e.*, the first and last pairs are much the shorter and the two middle pairs are much the longer and stouter.

The abdomen in the female is unknown: in the male it is narrow, and consists of 5 separate joints, the 3rd 4th and 5th segments being fused, but without obliteration of sutures.

It seems to me of very doubtful utility to separate this form from *Paraclistostoma*, de Man, or either of them from *Clistostoma*, De Haan (as restricted by de Man).

68. *Tylodiplax indica*, n. sp.

Two young males from Karachi are in the Indian Museum: their chelipeds are still of the female *Macrophthalmus* type, so that it is impossible to give a complete diagnosis of the species.

Carapace more or less hairy, finely punctate, its length less than two-thirds its greatest breadth which, owing to the strong divergence, from before backwards, of the lateral borders, is posterior; its antero-lateral angle is an obtuse angle. The gastric region is defined by a perfectly circular line.

Front square-cut, laminar, but not projecting beyond the inner angles of the orbits, from which it is separated by a groove: the front is concave in the middle line.

The pigment of the eyes is small in amount, and is placed some distance behind the end of the eyestalks.

The merus of the external maxillipeds is longer and much broader than the ischium, and has its antero-external angle considerably dilated, and its surface somewhat granular.

The chelipeds of the immature male, and the legs, are hairy, much as in *Macrophthalmus depressus*, the hairs on the posterior border of the merus of the 2nd pair of legs and on the dorsal surface of carpus and propodite of the 2nd and 3rd pair of legs being particularly thickset. The length of the longest (second) pair of legs is 2⅓ times that of the carapace, that of the last pair of legs is very little more than that of the carapace.

Two young males from Karachi: the carapace 6·5 millim. long and 11 millim. broad.

MACROPHTHALMUS, Latreille.

Macrophthalmus, Latreille, in Cuvier Règne An. (ed. 2) Vol. IV. p. 44 (1829): De Haan, Faun. Japon. Crust. p. 26: Milne Edwards, Hist. Nat. Crust. II. 63, and Ann. Sci. Nat., Zool. (3) XVIII. 1852, p. 155: Dana, U. S. Expl. Exp., Crust. pt. I. p. 312: Miers, Challenger Brachyura, p. 248.

Carapace depressed, quadrilateral, broader than (sometimes more than twice as broad as) long: the regions are well defined, the cervical and branchial grooves being characteristically conspicuous both on the dorsum of the carapace, and on the lateral border where they cut out two prominent teeth or lobes.

Front deflexed, narrow, often a narrow lobe as in *Gelasimus*: its free edge never approaches the epistome. The orbits are narrow trenches occupying the whole anterior border of the carapace between the front and the antero-lateral angles: eyestalks usually very long and slender, as in *Gelasimus*. The antennular flagella, which are rather small, fold transversely beneath, but are not concealed by, the front. The antennæ stand at the inner angle of the orbit: the basal joint is short, and the flagellum is of good length.

Epistome very short fore and aft, almost linear, but well delimited from the palate. Buccal cavern somewhat arched anteriorly. The external maxillipeds have a broad foliaceous ischium and merus (the latter about half the length of the former) and a coarse flagellum articulating with the antero-external angle of the merus: though the ischium and merus may not quite meet across the middle of the buccal cavern, the narrow interval that may exist between them is largely filled by the flagella, so that the underlying parts are concealed.

The chelipeds differ greatly in the sexes: in the female they are equal, and are shorter and slenderer than any of the legs except, perhaps, the short and weak last pair: in the *adult* male they are equal or subequal, and are longer and stouter than any of the legs except, perhaps, the particularly large and stout penultimate pair: in both sexes the fingers are curiously deflexed and bent or curved inwards distally.

Of the legs, the first and last pairs are usually singularly short and slender compared with the second and third pairs: the third pair are the longest and stoutest, being nearly or quite as large as the chelipeds, and the fourth (last) pair much the shortest and weakest of all. The dactylus in all is broad, stout, and laterally compressed.

The abdomen in both sexes consists of 7 separate segments, and in the male is narrower at base than the breadth of the sternum.

Key to the Indian species of Macrophthalmus.

- I. Carapace much broader than long, its sides are distinctly convergent posteriorly and the antero-lateral angles are acute and spiniform: front narrow:—
  - 1. The eyestalks project *nearly half their length* beyond the antero-lateral angles of the carapace .... *M. Verreauxi.*
  - 2. The eyestalks project slightly beyond the antero-lateral angles of the carapace: the true first tooth of the lateral border of the carapace belongs to the upper border of the orbit, and the antero-lateral angle of the carapace is formed by the true second tooth....... . .... *M sulcatus.*
  - 3. The eyestalks do not project beyond the antero-lateral angles of the carapace:—
    - i. Some of the borders of some of the leg joints are denticulate or spiny.......................... .... *M. pectinipes.*
    - ii. Legs smooth, except for a small subterminal denticle on the anterior border of the meropodites .... *M. convexus.*
- II. Carapace broader than long, its sides are parallel:—
  - 1. The tooth at the antero-lateral angle of the carapace is truncate and square-cut: front about an eighth the greatest breadth of the carapace: inner surface of the palm of the male smooth.......................... .... *M. depressus.*
  - 2. Front about a fourth the greatest breadth of the carapace: inner surface of the palm of the male armed with a spine......... .... *M. erato.*
- III. Carapace broader than long, its sides divergent posteriorly: two nearly parallel, obliquely longitudinal, finely beaded lines on the posterior part of each epibranchial region .... *M. tomentosus.*

Besides the fore-named, the four following species, of which I have not seen specimens, are said to occur in Indian Seas:—

(1) *M. simplicipes*, Guérin, Mag. de Zool. II. 1838, pl. xxiv. fig. 1: it appears to differ from *M. pectinipes* in having no spines or denticles on the leg-joints.

(2) *M. carinimanus*, Milne Edwards, Hist. Nat. Crust. II. 65, and Ann. Sci. Nat. Zool. (3) XVIII. 1852, p. 156: it appears to differ from *M. convexus* only in having a spine on the inner surface of the palm of the male cheliped.

(3) *M. pacificus*, Dana, U. S. Expl. Exp., Crust. pt. I. p. 314, pl. xix. fig. 4: it appears to differ from *M. erato* only in not having a spine on the inner surface of the palm of the male cheliped.

M. bicarinatus, Heller, Novara Crust. p. 36, pl. iv. fig. 2, which I am unable from the descriptions to distinguish from *M. pacificus*.

69. *Macrophthalmus Verreauxi*, Edw.

Macrophthalmus Verreauxi, Milne Edwards, Ann. Sci. Nat., Zool., (3) IX. 1848, p. 358, and XVIII. 1852, p. 155, pl. iv. fig. 25: Hess, Archiv f. Nat. XXXI. 1865, i. pp. 142, 171: de Man, Notes Leyden Mus. II. 1880, p. 184: Haswell, Cat. Austral. Crust. p. 89.

Carapace finely granular on the branchial regions, its length about two-thirds its greatest breadth, its sides slightly convergent posteriorly and cut anteriorly into 3 teeth, the first of which is the antero-lateral angle.

Front only very moderately deflexed, its least breadth (between the eyestalks) is about a fifth the greatest breadth of the carapace, very obscurely bilobed.

Orbits oblique, sinuous, their borders microscopically beaded. *The eyestalks project nearly half their length beyond the antero-lateral angles of the carapace.*

The external maxillipeds, when the flagella are folded, completely occlude the buccal cavern: the suture between the merus and ischium is oblique.

The legs are darkly variegated or incompletely banded, and are unarmed except for a subterminal spine on the anterior border of the meropodites of the first 3 pairs.

The chelipeds in the young male are not as long as, though more massive than, the 2nd and 3rd pairs of legs.

In the Indian Museum are 4 specimens, more or less damaged, from the Andamans and Mergui ("Investigator" collection). The largest male (which wants the chelipeds) has a carapace 9 millim. long and 14 millim. broad.

70. *Macrophthalmus pectinipes*, Guérin.

Macrophthalmus pectinipes, Guérin, Voy. Favorite, p. 167, pl. 49 (1839), and Mag. de Zool. II. 1839, Crust. (Cl. VII.) pl. xxiii (1838): Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 158: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 389: Ortmann, Zool. Jahrb., Syst., X. 1897–98, p. 340.

Carapace studded with large conspicuous pearly granules, its length in the adult male is about six-elevenths of its greatest breadth at the level of the second tooth of the lateral border: the lateral borders are slightly but distinctly convergent posteriorly where they are beaded or denticulate, anteriorly they are cut into three acute teeth the last of which is minute, the first being the outer orbital angle.

The front, measured at its narrowest part between the eyestalks, is barely a sixteenth the greatest breadth of the carapace: its free edge is distinctly bilobed. Orbits sinuous, a little oblique; their upper border elegantly denticulate, the lower border unevenly crenulate. Eyestalks slender and curved: the eye does not reach to the end of the orbital trench.

When their flagella are folded the external maxillipeds completely occlude the buccal cavern: the suture between the ischium and merus is hardly at all oblique.

In the adult male the chelipeds are from 2½ to 3 times the length of the carapace and longer than any of the legs except the 3rd (penultimate) pair: except the hand, their joints are not more massive than those of the 2nd and 3rd pair of legs. The arm is trigonal, its inner border being prominent and rising into a crest, on the most convex part of which is a short horny plate, called by de Man the "musical ridge": this border of the arm, as also the inner border and angle of the wrist and the extreme proximal end of the upper border of the palm, is serrated. The palm is nearly as long as the arm and is perfectly smooth and unsculptured, it has a tuft of hair at its extreme distal end, continuous with a thick fringe of hair along the upper border of the dactylus: the dactylus is about two-thirds the greatest length of the palm and has a molariform tooth at its basal end, but there is no such tooth on the immobile finger: the fingers meet only at the distal inbent end.

In the female and young male the chelipeds are short and slender, a good deal fringed with hair, but unsculptured, and the fingers are longer than the palm.

In both sexes the legs are alike, the 2nd and 3rd pairs being remarkably long and strong and the 1st and 4th (last) pairs being short and comparatively slender. The 3rd pair, which are the longest of all, are from 2½ to nearly 3 times the length of the carapace, the 4th pair are only about 1½ times the length of the carapace. In all but the last pair the meropodites carpopodites and propodites are scabrous, the anterior border of all these joints and the distal end of the posterior border of the meropodites being serrated: in the third pair only the posterior border of the propodite is very strongly serrated.

In the Indian Museum are 7 specimens from Karachi and one from Orissa. In a large male specimen the carapace is 35 millim. long and 62 millim. broad.

The great changes that occur in the chelipeds during the growth of the male indicate that caution is necessary in basing specific distinctions on the form of these organs in this genus.

71. *Macrophthalmus convexus*, Stimpson.

Macrophthalmus convexus, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 97: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 307: Haswell, Cat. Austral. Crust. p. 89:

de Man, Archiv f. Naturges. LIII. 1887, i. p. 354, pl. xv. fig. 4: Ortmann, Zool. Jahrb., Syst., VII. 1893–94, p. 745 and X. 1897–98, pp. 342, 344.

Macrophthalmus inermis, A. Milne Edwards, Ann. Soc. Ent. France, (4) VII. 1867, p. 286, and Nouv. Archiv. du Mus. IX. 1873, p. 277, pl. xii. fig. 5 (*apud* de Man).

Carapace smooth, becoming finely granular near the lateral margins, its length in the male is half, in the female decidedly more than half, its greatest breadth: on either branchial region, behind the branchial groove, are two granular eminences, one behind the other: 3 teeth arranged as in *M. pectinipes* at the anterior end of the posteriorly-convergent lateral borders, the first (outer orbital angle) being the most prominent and much the largest, the third minute.

Front, in its narrowest part between the eyestalks, about one-eleventh the greatest breadth of the carapace, its free edge obscurely bilobed. Orbits considerably oblique, the upper border microscopically beaded, the lower border finely and elegantly serrate. The eyestalks are slender and curved, and the eyes reach to the end of the orbital trench.

The suture between the ischium and merus of the external maxillipeds is decidedly oblique, and there is a distinct gap between these appendages even when their flagellum is folded.

The chelipeds have the same general proportions as in *M. pectinipes*: all the borders of the arm are granular or denticulate, but there is no "musical ridge" on the inner border: a bunch of spinules at the inner angle of the wrist: both borders of the palm, but particularly the lower border, are finely granular, and a fine raised granular line runs along the outer surface of the palm parallel with the lower border: the inner surface of the palm, like that of the fingers, is hairy, but quite smooth and unarmed beneath the hair: there is a small molariform tooth at the base of the dactylus, and a larger one having a forward slant on the immobile finger.

The legs have the same general proportions as in *M. pectinipes*, but they are quite smooth and unarmed, except for a small subterminal spine on the anterior border of the meropodites of the 2nd and 3rd pair.

In the Indian Museum are 5 specimens from the Andamans. The carapace of the largest specimen is 10·5 millim. long and 21·5 millim. broad.

72. *Macrophthalmus sulcatus*, Edw.

Macrophthalmus sulcatus, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII. 1852, p. 156: Ortmann, Zool. Jahrb. Syst. X. 1897–98, pp. 344, 345 (*nec synon.*).

Carapace free of granules in the female, studded with minute granules in the male, its length in the male only about three-eighths, in the female nearly half, its greatest breadth. On the branchial region, behind the branchial groove, are, in both sexes, three granular eminences, one behind the other, the last being on the posterior border. The lateral borders are convergent: their true *first* tooth, which in other species is at once the antero-lateral angle of the carapace and the outer angle of the orbit, appears in this species to belong to the *upper border* of the orbit, so that the antero-lateral angle of the carapace is formed by the much larger *second* tooth which also is the *apparent* outer orbital angle.

The least breadth of the front, between the eyestalks, is about an eighth the greatest breadth of the carapace: its free edge is very obscurely bilobed.

Orbits sinuous and oblique: the upper border microscopically beaded and furnished near its outer end with a sharp recurved tooth, which is really the outer orbital angle, though the apparent angle is the much larger tooth of the lateral border of the carapace: the lower orbital border is finely denticulated in its inner two-thirds, but is broken and indistinct beyond this. Eyestalks long, slender, curved: the eyes reach not only beyond the true limits of the orbit, but also beyond the antero-lateral angle of the carapace.

The external maxillipeds do not quite meet across the buccal cavern: the suture between the ischium and merus is decidedly oblique.

The legs and chelipeds have the same general proportions as in *M. pectinipes*, but the legs are unarmed.

In the male chelipeds the anterior border of the arm is hairy and strongly denticulated, but there is no "musical ridge:" the inner angle of the wrist and the proximal part of the upper border of the palm are also denticulated. On the outer surface of the palm there is a crest running close to, and parallel with, the lower border; and on the inner surface of the palm, near the middle line, is a longitudinal row of denticles the first one of which is considerably enlarged: the surface above this ridge, as also the inner surface of the fingers, is densely hairy. The dactylus is not nearly two-thirds the length of the palm: the immobile finger, but not the dactylus, has a strong molariform tooth at its basal end.

In the female the chelipeds are short and weak as usual, and the hand is quite smooth and has the borders — but specially the lower border — thin and sharp.

In the Indian Museum are a male and a female from the Andamans: the carapace of the male is 9 millim. long and 24 millim. broad.

73. *Macrophthalmus depressus*, Rüpp.

Macrophthalmus depressus, Rüppell, 24 Krabben Roth. Meer. p. 19, pl. iv. fig. 6, pl. vi. fig. 13: Milne Edwards, Hist. Nat. Crust. II. 66, and Ann. Sci. Nat. Zool. (3)

XVIII. 1852, p. 159: Heller, SB. Ak. Wien, XLIII. 1861, i. p. 362: de Man, Notes Leyden Mus. III. 1881, p. 255, and Archiv f. Naturges. LIII. 1887, i. pl. xv. fig. 3, and Journ. Linn. Soc., Zool., XXII. 1887-88, p. 124, and Zool. Jahrb., Syst. VIII. 1894-95, p. 578: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 389: Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 745 (?) and X. 1897-98, pp. 341, 342.

Macrophthalmus affinis, Guérin, Mag. de Zool. II. 1838, pl. xxiv. fig. 2: Milne Edwards, Ann. Sci. Nat. (3) XVIII. 1852, p. 158: Haswell, Cat. Austral. Crust. p. 88 (*apud* Ortmann).

Carapace studded with minute granules not always plainly visible to the naked eye, its length in the male about two-thirds of its breadth. The lateral borders are parallel and the antero-lateral angle is rather a square-cut lobe than a tooth. On the epibranchial regions, behind the branchial groove, are two nearly parallel obliquely-longitudinal finely-granular lines, the inner of which is faint.

Front, at its narrowest part, about an eighth the breadth of the carapace, longitudinally grooved, but its free edge is straight and not bilobed.

Orbits little sinuous and little oblique, their upper border microscopically, their lower border finely and evenly denticulate. Eyestalks slender, hardly curved, the eyes reach almost to the end of the orbital trenches.

When the flagella are folded there is not much space between the external maxillipeds: the suture between the ischium and merus of these appendages is hardly oblique.

In the male the chelipeds and legs have much the same general proportions as in *M. pectinipes*, but they are unarmed, except for a small subterminal denticle on the anterior border of the meropodites of the first three pairs of legs: on the other hand the inner surface of the joints of the chelipeds, and the upper surface of the leg-joints (especially of the meropodites) are densely hairy. The dactylus is more than two-thirds the length of the palm, which is smooth and unsculptured: there is a molariform tooth near the basal end of the dactylus, and a similar, but less distinct and more oblique, tooth on the immobile finger.

In the Indian Museum are 2 males from Mergui, besides several specimens from Aden. The carapace of the largest specimen is 14 millim. long and 22 millim. broad.

74. *Macrophthalmus erato*, de Man.

Macrophthalmus erato, de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 125, pl. viii. figs. 12-14, and Zool. Jahrb. Syst., VIII. 1894-95, p. 579.

Carapace quadrilateral, not granular to the naked eye, its length about two-thirds of its breadth, the cervical groove plain, but the branchial groove faint: the second tooth of the lateral border is a little more prominent than the first. *Front about two-ninths the breadth of the carapace,* square cut, longitudinally grooved, but not bilobed. Orbits slightly sinuous, hardly oblique: eyestalks little curved, stoutish, not quite reaching end of orbit. In the male the lower border of the orbit is peculiar: it is finely denticulate at its internal extremity and has a small lobule at its outer angle, and in between these it has the form of a prominent deflexed somewhat triangular lobe. In the female the lower border of the orbit is finely crenulate throughout. The external maxillipeds do not quite meet across the buccal cavern, and the suture between their ischium and merus is a little oblique.

All three borders of the arm are serrated, and the inner angle of the wrist and upper border of the arm are very finely denticulated. There is a strong "musical crest" obliquely parallel with the inner border of the arm and in the middle third of that border. Palm longer than the arm, its inner surface is hairy and carries a spine near the carpal end about midway between the upper and lower borders. The fingers are considerably less than two-thirds the length of the palm: there is a molariform tooth at the base of the dactylus and a larger slanting one on the immobile finger.

The upper surface of the legs, especially in the case of the third pair, is hairy.

In the Indian Museum are 4 specimens from Mergui and Akyab: the carapace of the largest specimen is 10 millim. long and 14 millim. broad.

75. *Macrophthalmus tomentosus*, Eyd. and Soul.

Macrophthalmus tomentosus, Eydoux and Souleyet, Zool. Voy. Bonite, I. p. 243, pl. iii. fig. 8, (1841): Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 159: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 279: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 122.

Carapace studded with very fine granules: its length is about two-thirds its greatest breadth, *which is behind the middle of the lateral border, the lateral borders being decidedly divergent posteriorly.* On either epibranchial region, behind the branchial groove, are two finely beaded obliquely-longitudinal lines. The first two teeth of the lateral borders are square-cut.

Front, in its narrowest part, about one-eleventh the greatest breadth of the carapace; though longitudinally grooved it is not bilobed.

Orbits hardly sinuous, not oblique; their upper border microscopically beaded, their lower border finely crenulate. The eyestalks are hardly curved, and the eyes do not reach to the end of the orbits.

The chelipeds and legs have the same general proportions as in *M. pectinipes*, but are shorter. Chelipeds unarmed and unsculptured, except for some spinules along the inner angle of the wrist and some denticles along the proximal part of the upper border of the palm: in the distal half of the inner border of the arm is a short upstanding horny "musical crest": the borders of the arm and the inner border of the fingers are hairy. The dactylus has a small molariform tooth near the base, and the immobile finger has a much larger one.

The legs are unarmed, except for a small subterminal denticle on the anterior border of the meropodites of the first 3 pairs: the upper surfaces of their joints are more or less hairy.

In the Indian Museum is a single specimen from Mergui: its carapace is 23 millim. long and 34 millim. broad.

Family MICTYRIDÆ, Dana.

MICTYRIS, Latreille.

Mictyris, Latreille, Gen. Crust. et Ins. p. 40 (1806), and in Cuvier Règne Animal, III. p. 21: Desmarest, Consid. Gen. Crust. p. 115, and Dict. Sci. Nat. XXVIII. 1823, p. 235: De Haan, Faun. Japon. Crust. p. 24: Milne Edwards, Hist. Nat. Crust. II. 36, and in Cuvier Règne An., Crust. p. 67, and Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 154: Miers, Challenger Brachyura, p. 278.

Carapace elongate globose, oval but truncated posteriorly by the short and perfectly straight posterior border, the cervical and cardio-branchial grooves well developed and making the regions very distinct and convex, the posterior border fringed with bristles, as is also the apposed very prominent edge of the first abdominal tergum.

The afferent branchial orifice is a singular valvular recess, formed dorsally by a semicircular notch in the margin of the carapace, and ventrally by a curious cup-shaped dilatation of the base of the epipodite of the external maxillipeds.

Front a narrow deflexed lobe as in *Ocypoda*. Orbits represented by a small post-ocular spine, the eyes, which are borne on shortish stalks, being quite unconcealed.

Antennules as in *Ocypoda*, the basal joint being large and exposed, while the flagellum is rudimentary and concealed beneath the front. Antennæ small but well formed, standing in the usual position.

Epistome short lozenge-shaped. Buccal cavity enormous, somewhat oval in outline. External maxillipeds very large and foliaceous, with a hemispherical bulge causing them to face as much laterally as ventrally: their greater part is formed by the ischium, the inner margin of which is hairy, especially at base: the merus is very much smaller than the ischium and carries the coarse hairy flagellum at its antero-external angle: the exognath is small, slender, and very inconspicuous.

Chelipeds moderately long and rather slender, stouter and a little shorter than the legs; their freest motion is in a vertical plane: the wrist is a rather elongate trigonal obconical joint.

Legs somewhat compressed: the first pair are the longest and the others decrease slightly in length in posterior succession.

The abdomen in both sexes is of a broad truncate-oval shape, the segments from the 2nd to the 6th gradually increasing in length but the 7th being narrow: in both sexes the abdomen is fringed with hairs.

Distribution: Indo-Pacific from China and Australia to the Andamans.

In habits the species of *Mictyris* resemble the Ocypodes, Gelasimi and Dotillæ.

76. *Mictyris longicarpus*, Latreille.

Mictyris longicarpus, Latreille, Gen. Crust. et Ins. p. 41 (1806): Desmarest, Consid. Gen. Crust. p. 115, pl. xi. fig. 2, and Dict. Sci. Nat. XXVIII. p. 236: Guérin, Icon. Règne An. Crust. pl. iv. fig. 4: Milne Edwards, Hist. Nat. Crust. II. 37, and in Cuvier Règne An. Crust. pl. xviii. fig. 2, and Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 154: Dana, U. S. Expl. Exp. Crust. pt. I. p. 389: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 99: Hess. Archiv f. Nat. XXXI. 1865, p. 142: Heller, Novara Crust. p. 40: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 276: Tozzetti, Magenta Crust. p. 185, pl. xi. figs. 5, *5a-c*: Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 22, pl. i. figs 5-7 (gastric teeth): Haswell, Cat. Austral. Crust. p. 116: Miers, Zool. H. M. S. Alert, pp. 184, 248, and Challenger Brachyura, p. 278: de Man, Archiv f. Naturges. LIII. 1887, i. p. 358, and Notes Leyden Mus. XII. 1890, p. 83: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 390: Aurivillius, Zur Biol. Amphib. Dekap. p. 38, pl. iii. figs. 10-11 (Mitg. K. Ges. Wiss. Upsala, 1893): Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 748, and in Semon's Forschungr. Crust. p. 58 (Jena. Denks. VIII): Stead, Zoologist, (4) II. 1898, p. 307: Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 272.

Carapace smooth, the regions moderately convex and dividing the dorsal surface into four lobes: edge of front broadly triangular: *linea anomurica* very distinct.

Chelipeds a little over 1½ times the length of the carapace: a strong spine at the inner angle of the ischium (sometimes absent in the female): usually some spinules along the distal part of the lower border of the arm: wrist with the upper border of the outer surface marginate, and with a tooth near the middle of the distal border of the inner surface: palm much shorter than the wrist and not much more than half the length of the fingers; the upper and lower borders of its outer surface are marginate, and the middle of its outer surface is traversed by two divergent ridges which are continued along the fingers: fingers slender and tapering, in the male there is an enlarged tooth near the base of the dactylus.

The legs, like the chelipeds, are rough under the lens: the edges of their propodites and dactyli are finely plumed: none of their joints are dilated: the first pair, which are slightly the longest, are about 1¾ times the length of the carapace.

In the Indian Museum are 5 specimens from the Andamans and 2 from the Nicobars.

Family HYMENOSOMIDÆ, Ortm.

Key to the Indian Genera or Sub-genera.

- I. Front conspicuously tridentate: the external maxillipeds do not quite meet across the buccal cavern and their exognath is not hidden in its proximal portion: chelipeds much more massive than the legs ... ... HYMENICUS.
- II. Front broadly triangular, or truncated: the external maxillipeds completely close the buccal cavern and their exognath is completely hidden:—
  - 1. The interantennular septum is a prominent plate: chelipeds in the male much more massive than the legs ... ... ELAMENA.
  - 2. The interantennular septum is a mere ridge; chelipeds in both sexes slender, not stouter than the legs ... ... TRIGONOPLAX.

ELAMENA, Edw.

Elamena, Milne Edwards, Hist. Nat. Crust. II. 33, and Ann. Sci. Nat., Zool., (3) XX. 1853, p. 223: Dana U. S. Expl. Exp. Crust. pt. I. p. 379: A Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 321.

Carapace flat dorsally, thin and almost lamellar, triangular or subcircular, its edges are usually turned up to form a thin circumscribing ridge and are without any teeth. Front broadly triangular, or sometimes truncated. There are no orbits and the eyes, though they may be hidden beneath the front, are exposed and non-retractile: a small post-ocular tooth may be present or not. The antennules fold beneath the front and are not visible from above when folded: the interantennular septum is a prominent plate. Antennal peduncle slender, the flagellum of no great length.

Epistome well defined and remarkably long fore and aft. Buccal cavern square; the external maxillipeds, which completely close it, have the merus about as large as the ischium, the palp articulating not far from the antero-external angle of the merus, and the exognath slender and concealed.

Chelipeds in the male subequal, massive, especially as to the palm. Legs long and slender.

The abdomen of the male does not quite fill all the space between the last pair of ambulatory legs.

77. *Elamena sindensis*, n. sp.

Carapace broadly piriform, smooth, flat, with no distinction of regions: its edge, which is slightly turned up, is entire and unarmed. Front a prominent broad triangular lamina, somewhat rounded at tip. No post-ocular tooth. Interantennular septum very prominent. Eyes not quite concealed beneath the front.

Male chelipeds about 1⅔ times as long as the carapace, palm massive and somewhat swollen, fingers stout and pointed and meeting throughout their length. Female chelipeds little longer than carapace, slender, with a slender palm and longish fingers spooned at tip.

Legs slender, the 1st pair not three times as long as the carapace: in all, there is a distinct tooth at the end of the anterior border of both the merus and carpus, and the dactylus is long compressed and falcate with two or three teeth at the end of its posterior border.

In the Indian Museum are 7 specimens from Karachi: the carapace of a male is 5 millim. long and 6 in greatest breadth.

78. *Elamena truncata* (Stimpson ?).

? *Trigonoplax truncata*, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 109.

Elamena truncata, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 323: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 395.

Carapace orbiculate-ovate, smooth, flat, with no distinction of regions, its edge, which is slightly turned up and entire and unarmed, shows the faintest traces of angulation in 2 or 3 places. No post-ocular tooth; eyes quite concealed beneath the front. The front, though it projects slightly beyond the carapace is *broadly truncated*, having its free margin cut quite straight. Interantennular septum very prominent. The female chelipeds and the legs are as in the preceding species, the anterior border of the merus and carpus of all the legs ending in a strong tooth.

In the Indian Museum is a female from the Nicobars.

TRIGONOPLAX, Edw.

Trigonoplax, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 224.

This is best regarded as a subgenus of *Elamena*, from which it differs only in the following unimportant particulars:—(1) the edge of the carapace is not turned up, (2) the interantennular septum is a mere ridge, (3) the chelipeds in the male, as in the female, are very slender.

79. *Elamena* (*Trigonoplax*) *unguiformis*, De Haan.

Elamene unguiformis, De Haan, Faun. Japon. Crust. p. 75, pl. xxix. fig. 1 and pl. H: J. R. Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 394.

Trigonoplax unguiformis, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 224: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 31.

Carapace smooth, flat, lamellar, broadly pentagonal with the postero-lateral sides about a third as long as any of the others, the regions not defined, the sides entire, unarmed. Front a broad, horizontal, triangular lamina. No post-ocular tooth: eyes not concealed by the front, though the eyestalks are. Interantennular septum a mere ridge.

Epistome as long as broad. Chelipeds and legs smooth and slender.

Chelipeds not stouter than the legs, about 1½ times as long as the carapace: fingers slender, as long as the slender sub-cylindrical palm, their tips spooned.

The anterior border of the meropodite of all the legs ends in an inconspicuous denticle, the dactylus of all is long, subfalciform, and strongly compressed, and has two or three denticles at the tip of the posterior border. The 2nd and 3rd pair of legs, which are the longest, are more than three times the length of the carapace.

In the Indian Museum are 5 specimens from the Andamans. The carapace of one is 12 millim. long and 14 in greatest breadth.

HYMENICUS, Dana.

Hymenicus, Dana, Amer. Journ. Sci. (2) XII. 1851, p. 290, and U. S. Expl. Exp. Crust. pt. I. p. 387: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 224.

Differs from *Elamena* only in the following particulars:—

(1) the front is tridentate and the ridge that defines the edge of the carapace dorsally is continued across its base between the eyes: (2) the interantennular septum, as in *Trigonoplax*, is a mere ridge: (3) on either lateral border of the carapace teeth are sometimes present: (4) the external maxillipeds do not quite meet across the buccal cavern and their exognath is not hidden in its proximal portion.

Rhynchoplax of Stimpson (Proc. Ac. Nat. Sci. Philad. 1858, p. 109) is probably synonymous.

Key to the Indian species of Hymenicus.

I. Median spine of the rostrum of moderate length: 3 teeth on either lateral border of the carapace ... *H. Wood-Masoni.*

II. Median spine of the rostrum very long: no teeth on the lateral borders of the carapace ... ... *H. inachoides.*

80. *Hymenicus Wood-Masoni*, n. sp.

Body and chelipeds tomentose. Carapace dorsally flat or sunken, longer than broad, circular without the rostrum, the regions demarcated by fine grooves.

The front, which is delimited from the rest of the carapace by a fine raised line running across its base between the eyes, is cut into 3 prominent teeth, the middle one of which is somewhat the largest. The antennules fold beneath the front.

A small post-ocular denticle: a large tooth on the lateral border of the carapace above the base of the 1st pair of legs, another, hardly smaller, midway between this and the front, a third, much smaller, midway between this and the post-ocular denticle.

Chelipeds in the adult male more than twice the length of the carapace, very much stouter than the legs, the palm being specially massive. When denuded, the upper border of the arm is dentate and there is a stout spine near the far end of the outer border of this joint: there are several sharp tubercles on the upper surface of the wrist, the outer surface of the palm is reticulate in places, and the fingers which are stout and as long as the palm, have elegantly interlocking teeth.

In the female the chelipeds are considerably shorter and, though stouter than the legs and formed on the male pattern, are not nearly so stout as in the male.

The legs have long, curved dactyli, which are armed with small recurved teeth at the distal end of the posterior border: the 2nd pair, which are a little the longest, are over $2\frac{1}{2}$ times the length of the carapace

Carapace of male (including rostrum) 7·5 millim. long and 6 broad.

Specimens were collected by the late Professor Wood-Mason at Port Blair in the Andamans, and at Port Canning near Calcutta.

81. *Hymenicus inachoides*, n. sp.

Carapace somewhat tomentose, flat, elongate-triangular, ending in a rostrum of three long teeth of which the middle one is about a third the length of the rest of the carapace, the other two being more than half the length of the middle one. The regions are all well defined by grooves. No spines on the lateral borders of the carapace. Post-ocular denticle hardly distinguishable. The antennules fold beneath the front.

Chelipeds of the adult male somewhat tomentose, not $1\frac{1}{2}$ times the length of the carapace: arm slender, with a tooth near the distal end of the outer border; palm short, high, produced and somewhat swollen below; the fingers a little longer than the palm, stout, and finely toothed.

Legs long and slender, with long dactyli furnished with hook-like teeth at the end of the posterior border: the 2nd pair of legs are nearly three times the length of the carapace.

A single male from Port Canning near Calcutta: its carapace is 8·5 millim. long and 6 millim. in its greatest breadth.

Family GRAPSIDÆ Dana.

Key to the Indian Genera.

- I. The antennules fold beneath the front in the ordinary way:—
  - 1. No oblique hairy ridge on the exposed surface of the external maxillipeds:—
    - i. A very wide gap between the external maxillipeds, the exopodites of which appendages are narrow, and the palp of which appendages articulates at or near the antero-external angle of the merus: the abdomen of the male fills all the space between the last pair of ambulatory legs (*Grapsinæ*):—
      - A. Front less than half the greatest breadth of the carapace: merus of the external maxillipeds longer than broad:—
        - *a.* Fingers with broad spooned tips: flagellum of exopodite of external maxillipeds well developed. GRAPSUS.
        - *b.* Fingers acute, not spooned: flagellum of exopodite of external maxillipeds absent .... GEOGRAPSUS.
      - B. Front more than half the greatest breadth of the carapace: merus of the external maxillipeds broader than long:—
        - *a.* Antennæ completely excluded from the orbit...... .... METOPOGRAPSUS.
        - *b.* Antennæ in the orbital hiatus... PACHYGRAPSUS.
    - ii. A moderate gap between the external maxillipeds, the exopodites of which appendages are broad, and the palp of which appendages articulates near the middle of the anterior border of the broad merus: the abdomen of the male does not quite fill all the space between the last pair of legs (*Varuninæ*):—
      - A. Exognath of the external maxillipeds not as broad as the ischiognath: terminal joints of legs thin broad and compressed .... VARUNA.

B. Exognath of the external maxillipeds as broad as or broader than the ischiognath: dactyli of the legs compressed but not broadened:—
 a. Carapace flat and depressed .... PTYCHOGNATHUS.
 b. Carapace deepish, strongly convex in both directions .... PYXIDOGNATHUS.

2. An oblique hairy ridge on the exposed surface of the external maxillipeds (*Sesarminæ*):—
 i. Carapace little, sometimes not at all, broader than long, the pterygostomian regions and sidewalls with a sieve-like reticulation: lower border of orbit not abnormally prominent:—
  A. Antennæ lodged in the orbital hiatus:—
   a. Carapace nearly square: front abruptly and vertically deflexed .... SESARMA.
   b. Antero-lateral borders of carapace arched: front obliquely deflexed .... SARMATIUM.
  B. The tooth at the inner angle of the lower border of the orbit meets the front, so as to exclude the antennæ from the orbit:—
   a. Carapace dorsally smooth and nude .... METASESARMA.
   b. Carapace dorsally verrucose and densely tomentose .... CLISTOCŒLOMA.
 ii. Carapace much broader than long, the pterygostomian regions, etc., not reticulated: lower border of orbit prominent beyond the front. Front gradually declivous. General appearance much like *Macrophthalmus*........ METAPLAX.

II. The antennules fold nearly longitudinally in deep notches in the front visible in a dorsal view (*Plagusiinæ*):—
 1. Merus of the external maxillipeds of good size and as broad as the ischium.............................. PLAGUSIA.
 2. Merus of the external maxillipeds small and much narrower than the ischium.............................. LIOLOPHUS.

Sub-family GRAPSINÆ, Dana (pt.).

GRAPSUS, Lamk., Kingsley.

Grapsus (part) Lamark, Syst. Anim. Sans Vertebr.: Latreille, Hist. Nat. Crust. et Ins. VI. p. 56, and Gen. Crust. p. 32.

Grapsus, Leach, Trans. Linn. Soc. XI. 1815, pp. 309, 323.

Grapsus (part) Desmarest, Consid. Gen. Crust., p. 129, and Dict. Sci. Nat. XXVIII. p. 247: Milne Edwards, Hist. Nat. Crust. II. 83, and Ann. Sci. Nat., Zool., (3) XX. 1853, p. 166: Dana, U. S. Expl. Exp. Crust. pt. I. p. 336.

Grapsus, Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, pp. 188 and 192: Miers, Challenger Brachyura, p. 254.

Goniopsis, De Haan, Faun. Japon. Crust. p. 33.

Carapace little broader than long, much depressed, the regions fairly well defined, the branchial groove particularly clear, the branchial regions with regular obliquely transverse ridges, the gastric region with a transverse squamiform sculpture. The lateral borders are arched and are armed with a tooth, placed immediately behind the acute outer orbital angle.

Front about half the breadth of the anterior border of the carapace, strongly deflexed: along the line of flexion are 4 tubercles, the outer of which on either side correspond with the supra-orbital angles.

Orbits of moderate size, deep, distinctly divided into two fossæ: their lower border is deeply notched near the outer angle: the wide inner orbital hiatus is filled partly by the antennal peduncle and partly by a strong isolated tooth that belongs to the inner of the two fossæ into which the orbit is divided.

The antennules fold nearly transversely in rather narrow fossæ: the interantennulary septum is very broad. The antennal flagellum is short, and lies practically in the orbital cavity: the excretory tubercle of the basal antenna-joint is singularly prominent.

Epistome of good length fore and aft, well defined; its wings run up towards the orbital hiatus. Buccal cavity square with the antero-lateral corners rounded off. The external maxillipeds are widely distant, leaving between them a rhomboidal gap in which the mandibles are exposed: the ischium and merus are both narrow, the merus being slightly shorter than the ischium, and the palp, which is coarse—especially as to its carpus—articulates at the antero-external angle of the merus.

Chelipeds subequal in both sexes and much shorter than the legs, though, in the male, of a somewhat stouter make: hands and fingers short and stout, the tips of the fingers broad and hollowed *en cuillère*.

Legs broad and compressed, especially as to the merus: the dorsal surface of some of the joints has a sort of reticulate or squamiform sculpture, and the dactyli are thorny.

The abdomen in both sexes consists of 7 segments, and in the male its base is as broad as the sternum between the last pair of legs.

Distribution: rocks and reefs of all the tropical and subtropical seas.

The *Grapsi* of Indian seas are found in considerable number wherever there are rocks. They live out of water and are very cunning and active: if they cannot succeed in dodging their pursuer they fling themselves into the sea and in that way escape capture. Their colour in life is a dark bottle-green.

82. *Grapsus grapsus* (Linn.).

Seba, Thesaurus, III, p. 43, pl. xviii. figs. 5, 6.

Cancer grapsus, Linnæus, Syst. Nat. (ed. xii.) p. 1048: Fabricius, Ent. Syst. II. p. 438 and Suppl. p. 342.

Grapsus maculatus (Catesby, 1743), Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 167, pl. vi. fig. 1: Hoffmann, in Pollen and Van Dam, Faun. Madagasc., Crust., p. 21: Brocchi, Ann. Sci. Nat., Zool., (6) II. 1875, Art. 2, p. 78 (male appendages): Kingsley, Proc. Ac. Nat. Sci. Philad. 1879, p. 401, and 1880, p. 192: de Man, Notes Leyden Mus. V. 1883, p. 159: Miers, Zool. H. M. S. Alert, pp. 518, 544, and Challenger Brachyura, p. 255: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 236: R. I. Pocock, Journ. Linn. Soc., Zool., XX. 1890, p. 512: de Man, Notes Leyden Mus. XIII. 1891, p. 49: Koelbel, Ann. Nat. Hofmus. Wien, VII. 1892, p. 114: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 391: A. Milne Edwards and Bouvier, Hirondelle Crust. (Monaco, 1894) p. 47: de Man, Zool. Jahrb. Syst. IX. 1895-97, p. 79: Whitelegge, Mem. Austral. Mus. III. 1897, p. 139: Nobili, Boll. Mus. Torino, XII. 1897, p. 3. *Grapsus maculatus* var. *pharaonis*, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 285.

Grapsus pictus, Latreille, Hist. Nat. Crust. et Ins. VI. p. 69, pl. xlvii. fig. 2, and Genera Crust. p. 33: Lamarck, Hist. Nat. Anim. Sans Vert. V. p. 248: Dumeril, Dict. Sci. Nat. XIX. p. 322: Desmarest, Consid. Gen. Crust. p. 130, pl. xvi. fig. 1: Milne Edwards, in Cuvier Règne An. pl. xxii. fig. 1, and Hist. Nat. Crust. II. 86: Milne Edwards and Lucas, Voy. Amer. Merid., Crust. p. 28: Gay, Hist. Fisica Chili, pt. III. Zool. p. 166: Dana, U. S. Expl. Exp. Crust. pt. I. p. 336: ?Desbonne and Schramm, Crust. Guadal. p. 49: Martens, Archiv f. Nat. XXXVIII. 1872, p. 106: Miers, Cat. Crust. New Zeal. p. 36, and P. Z. S. 1877, p. 73, and Phil. Trans. 1879, p. 489, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 310: Smith, Trans. Connect. Acad. IV. 1880, p. 256: Tenison Woods, Proc. Linn. Soc. N. S. W. V. 1880-81, p. 117: Ozorio, Journ. Sc. Nat. Lisb. XI. 1885-87, p. 227. *Grapsus pictus* var. *ocellatus*, Studer, Abh. Ak. Berlin, 1882, Gazelle Crust. p. 14: *Grapsus pictus* var. *Webbi*, Hilgendorf, SB. Nat. Freunde Ges. 1882, p. 24.

Grapsus ornatus, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 168.

Grapsus pharaonis, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 168: Heller, SB. Ak. Wien. XLIII. 1861, i. p. 362: Hoffmann in Pollen and Van Dam, Faun. Madagasc. Crust. p. 20, pl. v. figs. 32-35: Richters, in Mobius, Meeresf. Maurit. Crust. p. 156.

Grapsus Webbi, Milne Edwards, Ann. Sci. Nat. (3) XX. 1853, p. 167: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 102.

Grapsus altifrons, Stimpson, Ann. Lyc. Nat. Hist. N. Y. VII. 1862, p. 230.

Grapsus grapsus, Ives, Proc. Ac. Nat. Sci. Philad. 1891, p. 190: Ortmann, Zool. Jahrb. Syst. VII. 1893-94, p. 703: Faxon, Mem. Mus. Comp. Zool., XVIII. 1895, p. 30: Rathbun, Proc. U. S. Nat. Mus. XXI. 1898, p. 604.

Goniopsis picta, De Haan, Faun. Japon. Crust. p. 33, and Krauss Sudafr. Crust. p. 46.

Carapace somewhat discoidal in shape, owing to the curvature of the sides: its regions well defined: the transverse and oblique ridges are salient, and the surface between the latter is coarsely reticulate.

Front deep and almost vertically deflexed, overhanging the epistome and much concealing the antennules, its free edge crenate.

Length of the epistome one-third or more of its greatest breadth. The tooth at the inner angle of the orbit is blunt.

Chelipeds in the male hardly longer than the carapace, shorter in the female: inner border of ischium and arm strongly spinate, and there are one or two less acute spines at the far end of the outer border of the arm: wrist with fine scattered tubercles on its upper surface, and with its inner angle produced to form a talon-shaped spine: palm nearly as high as long, its outer surface sculptured, its upper border culminating in a tooth: the fingers have very broad rounded tips, and the length of the dactylus in the male is nearly twice the length of the upper border of the palm.

Of the legs the 1st pair are very decidedly the shortest and the 3rd pair the longest, the latter being about twice the length of the carapace: the 4th pair are longer than the first by a dactylus, and shorter than the 2nd by about two-thirds of a dactylus. Only in the last pair of legs does the breadth of the merus approach half the length of the same joint: the far end of the upper border of the merus is spine-like and there are usually 2 or 3 spines at the far end of the lower border.

In the Indian Museum are 18 specimens from the Laccadives, the Andamans, the Coromandel coast, and Ceylon. The carapace of a large specimen is 64 millim. long and 68 millim. broad.

83. *Grapsus strigosus* (Herbst).

Cancer strigosus, Herbst, Krabben, III. i. p. 55, pl. xlvii. fig. 7. *Grapsus strigosus*, Bosc, Hist. Nat. Crust. I. p. 203: Latreille, Hist. Nat. Crust. et Ins., VI. p. 70, *etc.*: Milne Edwards, Hist. Nat. Crust. II. 87: Gay, Hist. Fis. Chili, III. Zool. p. 168: Dana, U. S. Expl. Exp. Crust. pt. I. p. 338: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 169: Stimpson, Journ. Bost. Soc. Nat. Hist. VI. 1857. p. 466: Kinahan, Journ. Roy. Soc. Dubl. I. 1858, p. 340: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 102: Hess, Archiv f. Nat. XXXI. 1865, i. pp. 147, 171: Heller, Novara Crust. p. 47: A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71 and IX. 1873, p. 286 (*ubi synon.*): Hilgendorf in v. d. Decken's Reis. Ost-Afr. III. i. p. 87: Hoffmann, in Pollen & Van Dam, Faun. Madag. Crust. p. 20, pl. v. fig. 31: Lockington, Proc. Calif. Acad. VII. 1876, p. 151: Kossmann, Reise roth. Meer., Crust. p. 60: Miers, P. Z. S. 1877, p. 136, and Ann. Mag. Nat. Hist. (5) II. 1878, p. 410: Hilgendorf, MB. Ak. Berl. 1878, p. 808: E. Nauck, Zeits. Wiss., Zool. XXXIV. 1880, p. 32 (*gastric teeth*): Kingsley, Proc. Ac. Nat. Sci. Philad. XXXII. 1880, p. 194: Haswell, Cat. Austral. Crust. p. 97: Miers, Zool. H. M. S. Alert, pp. 518, 544, and Challenger Brachyura, p. 256: Müller, Verh. Nat. Ges. Basel, VIII. p 475: de Man, Archiv f. Nat. LIII. 1887, i. p. 365, and Journ. Linn. Soc. Zool. XXII. 1888, p. 148: Cano, Boll. Soc. Nap. III. 1889, p. 236: Walker, Journ. Linn. Soc., Zool., XX. 1886–1890, p. 110: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 390: de Man, Zool. Jahrb. Syst. IX. 1895–97, p. 80: Ortmann, Zool. Jahrb., Syst., 1893–94, p. 705: Wedenissow, Bull. Soc. Ent. Ital. 1894, p. 415.

Grapsus albo-lineatus, Lamarck, Hist. Nat. Anim. Sans Vert. V. p. 249 (*fide* Edw.).

Gonioposis flavipes, Macleay, Ill. Ann. S. Africa, p. 66, and Krauss, Sudafr. Crust. p. 46 (*apud* Miers).

Goniopsis strigosa, De Haan, Faun. Jap. Crust. p. 33: Macleay, *loc. cit.*: Krauss, *loc. cit.*

Grapsus granulosus, *pelagicus*, and *Peroni*, Milne Edwards, Ann. Sci. Nat. (3) XX. 1853, p. 169 (*fide* A. M. E.).

The chief differences between this species and *G. grapsus* are the following:—

The branchial grooves of the carapace are not so well cut, the transverse and oblique ridges are low and smooth, and the surface between the oblique ridges is quite smooth.

The front is not so deep and is obliquely deflexed, hardly overhanging the epistome and not concealing the antennules, and its free edge is not so distinctly crenulate. The tooth at the inner angle of the orbit is subacute. The length of the epistome is not nearly a third its greatest breadth.

In the chelipeds, the tooth at the inner angle of the wrist is nearly straight, not talon-like, the length of the upper border of the palm is nearly two-thirds the length of the dactylus, and the tips of the fingers are not so broad and blunt.

In the legs the meropodite is broader, its greatest breadth being half its length. Moreover the difference in size between the 1st and 4th pairs of legs is much less marked.

In the Indian Museum are 76 specimens, from the Baluchistan and Sind coast, the Malabar coast, Ceylon, the Coromandel coast, the Arakan and Tenasserim coast, Mergui, the Andamans, and the Nicobars.

The carapace of the largest specimen (a female) is 59 millim. long and 63 millim. broad.

GEOGRAPSUS, Stimpson.

Geograpsus, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 101: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, pp. 188, 195: Miers, Challenger Brachyura, p. 260.

Orthograpsus, Kingsley, *l. c.* pp. 188, 194.

Closely resembles *Grapsus*, but differs in the following important particulars:—

The carapace is more quadrate, the sides being very little arched, it is also broader and less depressed. The lobe at the inner inferior angle of the orbit is not so completely isolated. The antennal peduncle is not so massive, nor is its "urinary tubercle" conspicuous. The epistome is shorter fore and aft, and is much less well defined.

The chelipeds are altogether of a different type, being vastly more massive than the legs, and in the adult male at least as long as the longest legs: the fingers are pointed. Though the dactyli of the legs are thorny, they are not so closely covered with thorns, nor are the thorns so coarse, as in *Grapsus*. Between the coxæ of the 2nd and 3rd pair of legs is a narrow fossa fringed with hair leading to the branchial cavity.

The two Indian species of the genus are land-crabs and are found in the jungles of the Andaman and Nicobar islands and in the villages of the Laccadive islands. They are extremely vigilant and active.

84. *Geograpsus Grayi* (Edw.).

Grapsus Grayi, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 170.

Geograpsus rubidus, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 103.

Geograpsus Grayi, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 288: Miers, Phil. Trans. 1879, p. 489, and Zool. H. M. S. Alert, pp. 518, 545, and Challenger Brachyura, p. 261: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 196: Richters, in Mobius, Meeresf. Maurit. p. 156: Haswell, Cat. Austral. Crust. p. 98: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 707: de Man, Zool. Jahrb., Syst. IX. 1895-96, p. 80: Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 266.

Carapace subquadrilateral, a little convex, the lateral borders well defined anteriorly, ill defined and slightly convergent posteriorly: transverse markings fine, curved or oblique on the branchial regions, almost invisible on the gastric region.

The four tubercles along the line of flexion of the front are not salient; the edge of the front in a dorsal view is concave. The notch near the outer end of the lower border of the orbit is small and narrow. The epistome is rather ill defined.

Chelipeds in both sexes a little unequal: squamiform markings are present but, except on the arm, are indistinct, as also are the scattered granules on the upper surface of the palm. The larger cheliped may be a little under or a little over twice the length of the carapace. The inner border of the ischium is denticulate, the inner border of the arm is expanded to form a dentate lobe, and the inner angle of the wrist is spiniform.

The greatest breadth of the meropodites of the legs is less than half their length. The first pair of legs are slightly shorter than the 4th: the 2nd pair are the longest of all, being about twice the length of the carapace. The last 3 joints of all the legs are bristly.

Colours in life yellow-ochre, the greater part of the dorsum of the carapace livid bluish or purplish.

In the Indian Museum are 24 specimens from the Andamans, Nicobars, and Laccadives.

The carapace of a large male is 40 millim. long and 49 broad.

85. *Geograpsus crinipes* (Dana).

Grapsus crinipes, Dana, Proc. Ac. Nat. Sci. Philad. 1851, p. 249, and U. S. Expl. Exp. Crust., pt. I. p. 341, pl. xxi. fig. 6.

Geograpsus crinipes, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 101 : Heller, Novara Crust. p. 48 : Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 115 : Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 196 : Ortmann, Zool. Jahrb., Syst. VII. 1893-94, p. 706 : de Man, Zool. Jahrb., Syst. IX. 1895-97, p. 83 : Whitelegge, Mem. Austral. Mus. III. 1897, p. 139.

Grapsus rubidus, Hilgendorf, in v. d. Decken's Reisen Ost-Afr. Crust., p. 87, pl. v. : Hoffmann, in Pollen & Van Dam, Faun. Madagasc. Crust. p. 22.

Differs from *G. Grayi* in the following particulars : —

The carapace is quite flat, and the lateral borders, which are thin and well defined throughout their extent, are slightly *divergent* posteriorly : the transverse markings are distinct and *nearly straight*.

The four tubercles along the line of flexion of the front are salient, and the free edge of the front is quite straight. The notch near the outer end of the lower border of the orbit is large, and the lobule external to the notch is denticulate. The epistome is well defined from the palate by a granular or pectinate ridge.

The chelipeds in the male are nearly equal, but in the *female* they are unequal. The squamiform markings on the arm, wrist, and lower portion of the hand are distinct, as also are the vesiculous granules on the upper surface of the palm and dactylus.

The greatest breadth—near the far end—of the meropodites of the last 3 pairs of legs is *more than half* their length.

Colour in life bright red.

In the Indian Museum are 2 males and a female from the Andamans, a male from the Nicobars, and a female from the Laccadives. The carapace of a female is 40 millim. long and 45 broad.

METOPOGRAPSUS, Edw.

Metopograpsus, Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 164 : Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, pp. 188, 190 : Miers, Challenger Brachyura, p. 257.

Carapace quadrate, little broader than long, somewhat depressed, the regions not well defined, the branchial groove distinct, fine oblique grooves are present on the lateral parts of the branchial regions: the antero-lateral, or outer orbital angle, is acute, but there are no teeth on the lateral border behind it.

Front very broad, more than half the extreme width of the carapace, deflexed: along the line of flexion are four depressed lobes, the outer one of which on either side sometimes shows a tendency to split into two.

Orbits of moderate size, occupying the corners of the carapace: the lower border is notched near its outer end: the orbital hiatus is filled by a special lobe which belongs to the inner of the two fossæ into which the orbit is divided and this lobe completely excludes the antennæ from the orbit. The antennules fold nearly transversely in fossæ of good size. The antennæ have a short and slender flagellum: the basal joint of the peduncle is not very massive.

Epistome well defined, but short fore and aft. Buccal cavity square with the anterior corners rounded off. The external maxillipeds leave between them a rhomboidal gap in which the mandibles are exposed: the merus is shorter than the ischium, and carries the coarse palp at or near the antero-external angle.

Chelipeds either subequal or unequal, the larger one much more massive than the legs but shorter than the 2nd and 3rd pairs of these: fingers rather short and stout, with the tip spooned.

Legs broad and compressed, especially as to the merus, which joint—like the arm of the chelipeds—usually has some squamiform markings: the last three joints have bristly edges and the dactylus is thorny.

The abdomen in both sexes consists of 7 separate segments, and in the male its base is as broad as the sternum between the last pair of legs.

An Indo-Pacific genus.

86. *Metopograpsus messor* (Forskal) Edw.

Cancer messor, Forskal, Descrip. Anim. in itin. orient. p. 88. *Grapsus messor*, Milne Edwards, Hist. Nat. Crust. II. 88: Krauss, Sudafr. Crust. p. 43: Hoffmann in Pollen & Van Dam, Faun. Madag. Crust. p. 23: Sluiter, Tijds. Nederl. Ind. XL. 1881, p. 164. *Metopograpsus messor*, Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 165: Heller, SB. Ak. Wien, XLIII. 1861, p. 362, and Novara Crust. p. 44: A Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71: Kossmann, Reise roth. Meer., Crust. p. 57: Hilgendorf, MB. Ak. Berl. 1878, p. 808: Miers, Phil. Trans. 1879, p. 489, and Zool. H. M. S. Alert, pp. 184, 245, 518, 545, and Challenger Brachyura, p. 258: de Man, Notes Leyden Mus. II. 1880, p. 183, and Journ. Linn. Soc. Zool. XXII. 1887-1888, p. 144, pl. ix. fig. 11, and Archiv f. Naturges. LIII. 1888, i. p. 361, pl. xv. fig. 6, and in Weber's Zool. Ergebn. Niederl. Ost. Ind. II. p. 314:

Richters, in Mobius, Meeresf. Maurit. p. 156: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 190: Lenz & Richters, Abh. Senck. Nat. Ges. XII. 1881, p. 425: Müller, Verh. Nat. Ges. Basel, VIII. p. 475: Ozorio, Journ. Sci. Nat. Lisb. XI. p. 227: Henderson, Trans. Linn. Soc., Zool., (2) V, 1893, p. 390: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 701: Whitelegge, Mem. Austral. Mus. III. 1897, p. 139: Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 265.

Grapsus Gaimardi, Savigny, Descr. Egypt. Crust. pl. ii. fig. 3.

Metopograpsus Eydouxi and *intermedius*, Milne Edwards, Ann. Sci. Nat., Zool., (2) XX. 1853, p. 165 (*sec.* Kingsley, *l.c.*).

Pachygrapsus æthiopicus, Hilgendorf, in v. d. Decken, Reisen Ost-Afr., Crust. p. 88, pl. iv. fig. 2 (*fide* Kossmann, *l.c.*, and Hilgendorf, *l.c.*).

Carapace about four-fifths as long as broad, the sides distinctly convergent posteriorly; besides the oblique markings on the lateral parts of the epibranchial regions, there are some fine transverse markings on the post-frontal region.

Front about three-fifths the greatest breadth of the carapace, its free edge beaded, thin and prominent but hardly laminar, and slightly sinuous. Orbits little oblique, their major diameter is a little more than a third the width of the front: the inner angle of the lower border is denticulate.

Chelipeds unequal, the length of the larger one about 1½ times that of the carapace: there are wrinkles or squamiform markings on the upper surface of the arm and wrist and—along with some vesiculous granules—on the upper and lower borders of the hand. The inner border of the ischium is denticulate, the inner border of the arm is spinate and is expanded distally to form a laciniate lobe, and there is a spine, which may be double, at the inner angle of the wrist: the fingers have blunt tips, and the dactylus is not very much longer than the upper border of the palm.

Of the legs the 1st pair is the smallest and the 3rd pair the longest —about twice the length of the carapace: in all, the upper border of the merus ends in a spine and the lobe at the far end of the lower border is spinate: in the last three pairs the greatest breadth of the merus is half its length.

The terminal segment of the male abdomen is simply triangular.

In the Indian Museum are 56 specimens, from Karachi, Bombay, the Orissa coast, the Ganges Delta, the Arakan coast, and the Andamans. The carapace of the largest specimen is 23½ millim. long and 30 millim. broad.

87. *Metopograpsus maculatus*, Edw.

Metopograpsus maculatus, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 165: de Man, Journ. Linn. Soc., Zool., XXII. 1887-88, p. 145, pl. x. figs. 1-3.

Distinguished from the only other Indian species by the following characters:—

The carapace is much more elongate, its length being seven-eighths of its breadth, its sides are very markedly convergent posteriorly, and there are no transverse markings on the post-frontal region.

The front is nearly three-fourths the greatest breadth of the carapace, and its free edge is decidedly laminar and nearly straight.

The orbits are oblique: their major diameter is less than a third the breadth of the front and the inner angle of their lower border is not denticulate.

The fingers of the chelæ, though their tips are spooned, are not very blunt: the dactylus is much longer than the upper border of the palm.

Except perhaps in the last pair of legs, the meropodites are narrower, their greatest breadth being decidedly less than half their length.

In the male abdomen the terminal segment has a somewhat three-lobed appearance.

In the Indian Museum are two specimens from Mergui. It seems to me very doubtful whether they are distinct from *M. latifrons*, White (Jukes, Voy "Fly," II. 337, pl. ii. fig. 2).

PACHYGRAPSUS, Randall, Stimpson.

Pachygrapsus, Randall, Proc. Ac. Nat. Sci. Philad. 1839, p. 126: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 166: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 101: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, pp. 188, 198: Miers, Challenger Brachyura, p. 259.

Differs from *Metopograpsus* only in the following particulars:—

(1) the tooth or lobe at the inner angle of the lower border of the orbit is small and does not fill the orbital hiatus, so that the antennæ are not excluded from the orbit; (2) there may be a tooth or two on the lateral border of the carapace immediately behind the outer orbital angle.

Distribution: West Indies eastwards, through the Mediterranean, to the American Pacific coast.

88. *Pachygrapsus minutus*, A. M. Edw.

Pachygrapsus minutus, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 292, pl. xiv. fig. 2: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 201: de Man, Notes Leyden Mus. V. 1883, p. 158, and Archiv f. Naturges. LIII. 1887. i. p. 368, and Journ. Linn. Soc., Zool., XXII. 1888, p. 148: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 240.

Carapace a good deal broader than long, its whole dorsal surface marked with fine transverse and oblique lines: the lateral borders are strongly convergent posteriorly, and have no spine behind the acute outer orbital angle.

Front about three-fifths the greatest breadth of the carapace, moderately deflexed, its free edge slightly sinuous. Orbits little oblique, their major diameter more than a third the breadth of the front, their lower border not denticulate.

The chelipeds in the male are subequal and vastly more massive than the legs, and are about twice the length of the carapace, and, except for some squamiform markings on the arm, are smooth: the inner border of the ischium and both borders of the arm are crenulate, and the distal end of the inner border of the arm is expanded to form a denticulate lobe: the inner angle of the wrist is dentiform: the fingers are stout and blunt.

Of the legs the two middle pairs are the longest, being not twice the length of the carapace. In all the last three joints are bristly, and the merus has a spine at the far end of the anterior border and two largish spines at the far end of the posterior border.

The terminal joint of the male abdomen is simply triangular.

A small species: the carapace of the single specimen (from Mergui) in the Indian Museum is 6·5 millim. long and 10 millim. broad.

Subfamily Varuninæ.

Varuna, Edw.

Varuna, Milne Edwards, Dict. Hist. Nat. XVI. p. 511 (1830), and Hist. Nat. Crust. II. 94, and Ann. Sci. Nat. Zool., (3) XX. 1853, p. 176: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, pp. 188, 205: Miers, Challenger Brachyura, p. 265.

Trichopus, De Haan, Faun. Japon. Crust. p. 32.

Carapace very little broader than long, depressed, with thin sharp edges, the regions fairly well indicated. Front a little more than half the breadth of the anterior border and a little more than a third the greatest breadth of the carapace, straight, prominent, sublaminar, little deflexed. Antero-lateral borders of the carapace arched, cut into 3 teeth including the outer orbital angle.

Orbits small, of good depth, their lower border broken and incomplete. The antennules fold obliquely and the interantennulary septum is broad. Antennæ of fair size, standing in the orbital hiatus.

Epistome of good length, well defined. Buccal cavern square. The external maxillipeds gape, but not very widely: their exognath is not nearly as broad as the ischium: their merus is shorter, but anteriorly much broader, than the ischium, its antero-external angle being considerably produced, so that the palp articulates near the middle of the anterior border.

Chelipeds equal, but variable in size. In old males they are considerably longer, and vastly more massive, than the legs: in the female they are shorter, and though stouter are not vastly stouter than the legs. The fingers, though sharp pointed, are a little hollow-tipped.

The legs have the three terminal joints compressed, dilated, and plumed, for swimming: the 2 middle pairs are the longest, the last pair is the shortest.

The abdomen in both sexes consists of 7 separate segments: in the male it does not completely cover the sternum between the last pair of legs.

Distributed throughout the Indo-Pacific, ascending estuaries even into freshwater. Commonly found at sea on drift logs.

89. *Varuna litterata* (Fabr.) Edw.

Cancer litteratus, Fabricius, Ent. Syst. Suppl. p. 342: Herbst, Krabben, III. i. 58, pl. xlviii. fig. 4.

Grapsus litteratus, Bosc, Hist. Nat. Crust. I. p. 203, and Latreille, Hist. Nat. Crust. et Ins. VI. p. 71.

Varuna litterata, Milne Edwards, Dict. d'Hist. Nat. XVI. p. 511.

Trichopus litteratus, De Haan, Faun. Japon. Crust. p. 32: Dana, U. S. Expl. Exp. Crust. pt. I. p. 336, pl. xx. fig. 8.

Varuna litterata, Milne Edwards, Hist. Nat. Crust. II. p. 95, and Ann. Sci. Nat. Zool., (3) XX. 1853, p. 176: Lucas, Hist. Nat. Anim. Artic., Crust., p. 72, pl. iii. fig. 4: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 103: Heller, Novara Crust. p. 51, A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71, and IX. 1873, p. 295: Brocchi, Ann. Sci. Nat. (6) II. 1875, (*male appendages*): Miers, Cat. Crust. New Zealand, p. 40, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 310, and Challenger Brachyura, p. 265: Tozzetti, Magenta Crust. p. 122, pl. viii. figs. 2 *a–g*: Hilgendorf, MB. Ak. Berl. 1878, p. 808: Neumann, Crust. Heidelb. Mus., p. 27: Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 29 (*gastric teeth*): Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 205: Sluiter, Tijds. Nederl. Ind. XL. 1881, p. 164: Haswell, Cat. Austral. Crust. p. 103: Filhol, Crust. Nouv. Zel. in Miss. l'ile Campbell, p. 390: de Man, Archiv fur Nat. LIII. 1887, i. p. 371, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 315, and Zool. Jahrb., Syst. IX. 1895, p. 112: Henderson, Trans. Zool. Soc. (2) V. 1893, p. 391: Ortmann, Zool. Jahrb. Syst., VII. 1893–94, p. 713: Max Weber, Zool. Jahrb. Syst. X. 1898, p. 157: Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 267.

Carapace curiously pitted and frosted above, the regions well enough defined by grooves, which in places are broad shallow and uneven; the disposition of these grooves in the middle of the carapace makes a letter H. The borders of the carapace are thin and are sharply defined and finely beaded or milled: the antero-lateral borders are arched and are cut into three teeth, including the outer orbital angle: the postero-lateral boundary of the carapace, on each side, is a distinct facet.

The chelipeds vary, according to sex and age, from a little over once (in the female) to a little over twice (in old males) the length of the carapace. The borders of the arm are denticulated, especially the inner border; the inner angle of the wrist forms a large sharp spine with some spinules at its base; the inner surface of the palm is more or less granular, the outer surface has some fine reticulate markings and —running parallel with the lower border, on to the fixed finger— a raised line: the fingers are stout and strongly toothed, the dactylus being longer than the upper border of the palm.

The 2nd and 3rd pair of legs, which are about equal, are over 1½ times the length of the carapace: the 1st pair are a little more than a dactyl-length, the 4th pair a little less than a dactyl-length longer than the carapace. The only armature of the legs, which are typical swimming paddles, is a subterminal spine on the anterior border of the meropodite.

In the Indian Museum are 63 specimens from the seas of India. The carapace of the largest male is 50 millim. long and 56 millim. broad.

PTYCHOGNATHUS, Stimpson.

Ptychognathus, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 104: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, pp. 188, 203: de Man, Zool. Jahrb., Syst., IX. 1895, p. 90.

Gnathograpsus, A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 180.

Cœlochirus, Nauck, Zeits. Wiss. Zool. XXXIV. 1880, pp. 30, 66 (*teste* de Man).

Very closely resembles *Varuna*, from which it differs only in the following particulars :—

(1) the exopodite of the external maxillipeds is of remarkable breadth, being at least as broad as, and usually much broader than, the ischium of those appendages:

(2) the regions of the carapace are not always so well defined.

(3) the dactyli of the legs, though compressed, are not so broad.

Distribution: Islands of the Indo-Pacific, entering fresh water above any tidal influence.

Key to the Indian species of Ptychoynathus.

I. Carapace hardly broader than long: front prominent, straight or hardly sinuous: the antennules fold very obliquely :—
    1. Teeth of the antero-lateral border sharp and salient: regions of the carapace fairly well defined: fingers of the female chelæ nude :—
        i. Inner angle of the wrist dentiform, but not produced: a large shaggy patch of hairs on the inner surface of the hand of the male... *P. dentata.*

- ii. Inner angle of the wrist produced to form a long spine: a patch of hair on the outer surface of the hand of the male, near the finger cleft.. *P. onyx.*
- 2. Teeth of the antero-lateral border not salient, inconspicuous: regions of the carapace not, or hardly, indicated:—
  - i. A subterminal patch of bristles on the outer surface of the fixed finger of the female...... *P. andamanica.*
  - ii. Fingers of female nude .... *P. pusilla.*
- II. Carapace decidedly broader than long: front little prominent and decidedly sinuous: the antennules fold nearly transversely.. *P. barbata.*

90. *Ptychognathus dentata*, de Man.

Ptychognathus dentatus, de Man, in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 318, pl. xviii. fig. 9.

Carapace inappreciably broader than long, flat but not particularly depressed, its regions quite distinct, as also are the cervical and branchial groves and a pair of post-frontal tubercles: on the posterior part of each epibranchial region, obliquely parallel with the postero-lateral borders, is a fine ridge.

Front prominent, laminar, nearly straight, its extent is two-fifths the greatest breadth of the carapace.

Antero-lateral borders of the carapace cut into three sharp salient teeth, of which the first is much the largest, and the third much the smallest.

Upper border of the orbit very sinuous. The antennules fold very obliquely. Anterior border of the buccal cavern not granular, but having a median horizontal tooth.

Exognath oval, with a smooth and strongly convex surface: its greatest breadth in the male is more than twice that of the ischiognath, but in the female is only a little more than that of the ischiognath.

Chelipeds of the male more than $1\frac{1}{2}$ times the length of the carapace, smooth: inner angle of the wrist acute, but not spiniform: palm higher than long, inflated at the postero-inferior angle, and having a tussock of hairs in the middle of its inner surface: dactylus more than twice the length of the upper border of the palm, longer slenderer and less strongly toothed than the fixed finger: both fingers though hollowed at the tip are sharp-pointed. In the female the chelipeds are about as long as the carapace; the inner angle of the wrist is spiniform; the palm is not swollen and is nude, and its outer surface is traversed, near the lower border, by a fine raised line which extends nearly to the tip of the fixed finger.

The 2nd and 3rd pairs of legs are about $1\frac{4}{5}$ times, the 1st pair are not quite $1\frac{1}{2}$ times, and the 4th pair are are not $1\frac{1}{3}$ times, the length of the carapace: on the anterior border of the merus of the first three pairs is a subterminal spine.

The sidewall of the carapace and the basal joints of the legs have little tomentum.

In the Indian Museum are 2 males and an egg-laden female from "the Bay of Bengal" and 2 young females from Upper Tenasserim.

The carapace of the largest male is 19 millim. long and not quite 20 millim. in its greatest breadth.

91. *Ptychognathus onyx*, n. sp.

Very closely related to *P. spinicarpus*, Ortm., and to *P. Polleni* and *affinis*, de M., if these species are distinct.

This species very nearly resembles *P. dentata*, from which it differs, young males being compared with females of the same size, only in the following particulars :—

(1) the carapace though otherwise similar is much thinner and more depressed and its markings are not quite so distinct :

(2) in the middle of the anterior border of the buccal cavern is a slight prominence, but no distinct tooth :

(3) the exognath (*in the young male*) is, as in the female of *P. dentata*, but little broader than the ischiognath :

(4) in the chelipeds of the young male the inner angle of the wrist is produced to form a long spine; there is no hair on the inner surface of the palm, but on the outer surface, in the finger-cleft and extending along the fixed finger, there is a tuft of hair; the outer surface of the palm also, as in the female of *P. dentata*, is traversed, close to the lower border, by a raised line, which runs to the tip of the fixed finger; finally the fingers are blunter, and the dactylus is only about twice as long as the upper border of the palm.

Practically the chief distinction between this species and *P. dentata* is that in the male of this species the inner angle of the wrist forms a long spine, and the hair is on the outside instead of on the inside of the hand.

In the Indian Museum are two young males probably from Tavoy. The carapace is a little over 12 millim. long and 13 millim. broad.

92. *Ptychognathus andamanica*, n. sp.

Closely related to *P. pusilla*, of which it may be an Andaman variety.

Carapace not much broader than long, quite flat, much depressed, the regions are hardly indicated, even when the carapace is quite dry, but the H-shaped mark in the middle is always plainly visible, the whole surface is closely and finely punctate: there are no post-frontal tubercles, but on the posterior part of either epibranchial region there is a fine line running obliquely-parallel with the postero-lateral borders.

Front prominent, laminar, slightly sinuous, its extent is two-fifths the greatest breadth of the carapace.

The antero-lateral borders are cut into 3 not very acute or distinct lobes (including the outer orbital angle), of which the first is much the largest, and the last much the smallest.

Upper border of the orbit slightly sinuous: the antennules fold very obliquely. The anterior border of the buccal cavern is granular and a little concave.

The exognath is long and elliptical; its breadth in the female, is nearly twice that of the ischiognath.

The chelipeds in the female (male unknown) are about as long as the carapace, and their outer surface is very finely reticulate-granular: inner angle of wrist pronounced, but not spiniform: palm without hair, but there is a characteristic brush of stiffish hair at the tip of the fixed finger on its outer surface. The fingers have broad tips, especially the fixed finger, which is stouter and more strongly toothed than the dactylus: the dactylus is about twice as long as the upper border of the palm: the outer surface of the palm and fixed finger is traversed, near the lower border, by a fine raised granular line.

The legs have not much tomentum on the basal joints, but the anterior border of the meropodites is rather thickly fringed: the subterminal denticle on the anterior border of the meropodites is small, blunt, inconspicuous, or obsolescent. The 2nd and 3rd pair of legs, which are the longest, are about $1\frac{1}{2}$ times, the 1st pair are not $1\frac{1}{4}$ times, and the 4th pair are little more than once, the length of the carapace.

In the Indian Museum are two young females from a freshwater stream at the base of Saddle Hill in North Andaman Island. Their colour is dark mottled green. The carapace is a little over 13 millim. long and about 14 millim. broad.

93. *Ptychognathus pusilla*, Heller.

Ptychognathus pusillus, Heller, Novara Crust. p. 60: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 204: de Man, Notes Leyden Mus. V. 1883, p. 161, and Zool. Jahrb. Syst. IV. 1888–89, p. 440, and in Weber's, Zool. Ergebn Niederl. Ost-Ind. II. p. 325, and Zool. Jahrb. Syst. IX. 1895, p. 99, and X. 1898, pl. xxviii, fig. 22: Ortmann, Zool. Jahrb., Syst. VII. 1893–94, p. 712.

This species, which was first found in the Nicobar Islands, is not represented in the Museum collection and I have never seen it.

94. *Ptychognathus barbata* (A. M. Edw.).

Gnathograpsus barbatus, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 316, pl. xvii. fig. 4.

Ptychognathus barbatus, Ortmann, Zool. Jahrb. Syst. VII, 1893-94, p. 712: de Man, Zool. Jahrb., Syst., IX. 1895, p. 105.

Carapace decidedly broader than long, flat, depressed, the regions indistinct: the two postfrontal tubercles are fairly distinct, but there is no distinct raised line on the posterior part of the epibranchial regions, running obliquely parallel with the posterior borders, such as is present in all the other Indian species. There is a good deal of tomentum on the sides of the carapace.

Front decidedly sinuous, not prominent, its extent is a little more than two-fifths the greatest breadth of the carapace.

The antero-lateral borders of the carapace are cut into 3 not very conspicuous teeth (including the outer orbital angle) of which the first is much the largest and the third much the smallest, as usual.

Upper border of the orbit little sinuous: the antennules fold nearly transversely. Anterior border of the buccal cavern finely granular.

The exognath is elliptical, with a slightly convex surface: in the male its greatest breadth is more than that of the ischiognath, in the female it is slightly narrower than in the male.

Chelipeds in the male about $1\frac{2}{3}$ times the length of the carapace, the inner angle of the wrist little pronounced; the hand massive, with a tuft of hair in the finger-cleft and running some little distance along the outer surface of both fingers; the fingers are rather blunt, the dactylus, which is about twice the length of the upper border of the palm is longer slenderer and less strongly toothed than the fixed finger, against which it closes rather obliquely. In the female the chelipeds are about as long as the carapace and are not very massive, the inner angle of the wrist is dentiform, there is no hair on the hand or fingers, and the outer surface of the hand and fixed finger is traversed near the lower border by a raised line.

The leg-joints are less expanded and less abundantly plumed than in the other Indian species, and there is no subterminal spine on the anterior border of the meropodites. The 2nd and 3rd pairs of legs are about $1\frac{2}{3}$ times, the 1st pair about $1\frac{1}{2}$ times, and the last pair a little over once, the length of the carapace.

In the Indian Museum are 3 specimens from Diamond Island off the Pegu coast and from Akyab, (besides numerous specimens from Samoa). The carapace of an apparently adult male is 11 millim. long and 14 millim. broad.

PYXIDOGNATHUS, A. M. Edw.

Pyxidognathus, A. Milne Edwards, Bull. Soc. Philom. Paris (7) III. 1878, p. 109: de Man, Notes Leyden Mus. V. 1883, p. 160, and Journ. Linn. Soc., Zool., XXII. 1888, p. 148.

Hypsilograpsus, de Man, Notes Leyden Mus. I. 1879, p. 72 (*ipso teste*).

This genus is closely related to *Varuna* and *Ptychognathus*. It differs from *Varuna* in the same particulars that *Ptychognathus* does, that is to say, the exognath of the external maxillipeds is much broader than the ischiognath, and the dactyli of the legs though compressed are not dilated. It further differs, both from *Varuna* and *Ptychognathus* in the following characters :—

(1) the carapace is decidedly transverse, is deep, and is dorsally strongly convex in both directions : it is also anteriorly declivous with the front deflexed, and its antero-lateral borders are hardly arched :

(2) the antennules fold transversely :

(3) the lower border of the orbit is complete, except of course at the orbital hiatus :

(4) the carpopodites and propodites of the legs are not particularly broad.

Distribution : Indo-Pacific in fresh or brackish water.

Key to the Indian species of Pyxidognathus.

I. A single spine on the posterior border of the meropodites of the legs	*P. fluviatilis.*
II. More than one spine on the posterior border of the meropodites of the legs	*P. deianira.*

95. *Pyxidognathus deianira*, de Man.

Pyxidognathus deianira, de Man, Journ. Linn. Soc., Zool., XXII. 1888, p. 148, pl. x. figs. 4-6.

Carapace about $\frac{3}{4}$ as long as broad, convex, smooth, without distinction of regions excepting a faintish H-shaped mark in the middle. Free edge of front sinuous or four-lobed, as in the next species.

Antero-lateral borders of the carapace cut into three prominent acute teeth (including the outer orbital angle), the first of which is the largest, and the last of which is spine-like.

Upper border of orbit slightly sinuous, lower border finely denticulate.

Exognath of the external maxillipeds, in the male, very much broader than the ischiognath, and having a smooth convex surface.

Chelipeds in the young male about $1\frac{1}{2}$ times the length of the carapace : inner border of ischium, arm, and wrist denticulate ; inner angle of wrist spiniform; the upper border of the palm is granulate, a finely beaded raised line traverses the lower part of the outer surface of the palm and fixed finger, and there is a very short series of granules near the middle of the inner surface of the palm: the palm is nearly as high as long, and the dactylus is much longer than the upper border of the palm and closes against the fixed finger by the tip only.

The 2nd pair of legs, which are the longest, are not much short of twice the length of the carapace; the 4th pair, which are the shortest, are but little longer than the carapace. In all the legs, the meropodite has some fine rugosities on its upper surface, a spine near the far end of the anterior border, and some spines on the posterior border—these being most numerous in the case of the 4th pair of legs: and in all, the edges of the 3 terminal joints are hairy but not plumose, nor are these joints broadened or compressed.

In the Indian Museum are two very small male specimens from Mergui.

96. *Pyxidŏgnathus fluviatilis*, n. sp.

Carapace transverse, markedly convex, finely punctate, the regions indicated only by an H-shaped mark in its centre.

Front between two-fifths and a third the greatest breadth of the carapace, deflexed, sinuous or four-lobed, the two middle lobes broad, the outer lobes (= inner orbital angles) subacute.

Antero-lateral borders of the carapace slightly arched, cut into three prominent acute teeth (including the outer orbital angle) of which the first is the largest and least acute, and the third is spine-like.

Orbits of good depth, the upper border slightly sinuous, the lower border defined by a granular ridge running close behind the prominent denticulated ridge that bounds the infra-orbital region of the carapace.

Anterior border of buccal cavern prominent, finely crenulate. Exognath in the female broader than the ischiognath, and having a smooth convex surface.

Chelipeds in the female about as long as the carapace, more massive than the legs: inner angle of wrist acuminate: a raised line runs along the outer surface of the palm and fixed finger, close to the lower border: fingers rather sharp though spooned at tip, dactylus hardly twice the length of the upper border of the palm, longer and rather less strongly toothed than the fixed finger.

All the leg-joints are plumed, and all the dactyli are long compressed and recurved. In all the legs there is a very strong spine in the distal half of the posterior border of the meropodite, and in the first 3 pairs there is a smaller subterminal spine on the anterior border of the same joint. The 2nd and 3rd pairs of legs are about 1¾ times, the 1st pair are not quite 1½ times, and the 4th pair are about 1¼ times the length of the carapace.

Colour mottled dark green. A single female was found clinging to the floats of a fisherman's net in the R. Ichamutty above Bongong in the Jessore District: its carapace is 15 millim. long and 19 millim. broad.

The legs are obviously adapted for swimming, and the recurved dactyli and spiny meropodites appear to be adaptations to a swift current.

The chief difference between this species and *P. deianira*—the female of the former being compared with the male of the latter—is that in this species the three terminal joints of the legs are more compressed and the posterior border of the meropodites is armed with a single spine.

Sub-family SESARMINÆ, Dana.

SESARMA, Say.

Sesarma, Say, Journ. Acad. Nat. Sci. Philad. I. 1817, p. 76: Milne Edwards, Hist. Nat. Crust. II. 71, and Ann. Sci. Nat. Zool. (3) XX. 1853, p. 181: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 301: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 213: Miers, Challenger Brachyura, p. 269: de Man, Zool. Jahrb., Syst., II. 1886–87, p. 641 and IX. 1895–97, p. 128: Bürger, Zool. Jahrb., Syst., VII, 1893–94, p 613.

Pachysoma, De Haan, Faun. Japon. Crust., p. 33.

Holometopus, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 187.

Carapace squarish or actually square (the sides being straight and usually nearly parallel), usually deep (though occasionally shallow and much depressed), seldom very convex: the gastric region is almost always very well delimited, and is commonly divided into 5 subregions, and in most cases the 4 antero-lateral subregions project as 4 prominent post-frontal tubercles.

The side-walls of the carapace have everywhere a characteristic fine-meshed reticulate texture as regular as that of a sieve. This appearance is due to a multitude of small uniform granules arranged in pairs in close-set parallel rows: between each pair of granules is a little row of bristles, one of which in each row is long and points diagonally forwards.

The front occupies half, or more, of the anterior border of the carapace, and is obliquely or vertically deflexed.

The orbits, which occupy the rest of the anterior border of the carapace, are oval and of good depth: below their outer angle is a deepish gap leading into a system of grooves which open into a notch at the antero-lateral angle of the buccal cavern. At the inner angle of the orbit is the usual tooth, belonging to the inner of the two fossæ into which (as in all the crabs of this subfamily) the orbit is so plainly divided. The eyes are of no great length.

The antennules fold nearly transversely into rather narrow fossæ: the inter-antennular septum is very broad.

The antero-external angle of the 2nd joint of the antennal peduncle is a good deal produced: the antennal flagellum, which is slender and rather short, lies in the orbital hiatus.

Epistome well defined, prominent, rather short fore and aft. Buccal cavern square. The external maxillipeds leave between them a large rhomboidal gap, which is a good deal filled up by a hairy fringe: they are obliquely traversed, from a point behind the antero-external angle of the ischium to the antero-internal angle of the merus, by a conspicuous line or crest of hairs: the palp, which is rather coarse, is attached to the rounded summit of the obliquely-directed merus.

Chelipeds massive—not always so in the female—usually subequal, of no great length: palm high and short, the fingers though subacute, are hollowed at the tip.

The legs do not usually differ very markedly in length, though the third pair are the longest and the first and last (4th) pairs the shortest: the meropodites are thin, and are usually, but not always, broad.

The abdomen in both sexes consists of 7 separate segments: in the male it occupies the whole breadth of the sternum between the bases of the last pair of legs. In both sexes the second segment, as well as the exposed portion of the first, are narrow fore and aft. In the female the last segment is small and narrow from side to side, and is more or less impacted in the broad 6th segment: in the male also the last segment is much narrower than the one that precedes it.

Distribution: all tropical and subtropical seas: not found in the Mediterranean.

I am not inclined to adopt the subgenera proposed by Dr. de Man, although I must admit that his system is convenient in practice, for identifying species.

I may also mention here that specific distinctions based merely on the sculpture of the dactylus of the male chelæ are inadmissible, as the sculpturing frequently differs in the two fingers of the same individual.

Key to the Indian species of Sesarma.

- I. Carapace deepish, its length decidedly less than its breadth between the antero-lateral angles, its sides nearly parallel—never markedly divergent posteriorly :—
  - 1. The inner border of the arm bears, near its far end, a large acute tooth : on the upper surface of the palm of the male are at least two characteristic *oblique* comb-like ridges : the upper surface of the movable finger of the male is milled :—
    - i. Posterior border of the meropodites of the legs entire :—
      - *a.* No tooth on the lateral border of the carapace behind the orbital angle :—
        - *α.* Front more than half the extent of the anterior border of the carapace.................................. *S. quadratum.*
        - *β.* Front exactly half the extent of the anterior border of the carapace.................................. *S. pictum.*
      - *b.* A tooth on the lateral border of the carapace, behind the orbital angle .... *S. bidens.*
    - ii. Distal end of the posterior border of the meropodites of the legs acutely serrate (no tooth behind the outer orbital angle)... .... *S. Andersoni.*
  - 2. The inner border of the arm does not end in a large spine or acute lobe, though it may be a little dilated distally : there are no oblique pectinated ridges on the upper surface of the palm, and the upper surface of the movable finger of the male though it may be granular is not milled :—
    - i. A tooth at the inner angle of the wrist (a tooth on the lateral border of the carapace behind the orbital angle) :—
      - *a.* The breadth of the carapace between the antero-lateral angles is equal to, or more than, the breadth between the epibranchial teeth.................................. *S. Edwardsi.*
      - *b.* The breadth of the carapace between the antero-lateral angles is decidedly less than the breadth between the epibranchial teeth, the sides of the carapace being markedly sinuous............. .... *S. Meinerti.*
    - ii. No spine at the inner angle of the wrist :—
      - *a.* Carapace and appendages not uniformly tomentose : two acute teeth—the second of which is hardly visible—on the lateral border, behind the acute orbital angle.. *S. intermedium.*

b. Carapace and appendages covered with a short but very dense fur, amid which are prominent tubercle-like tufts of hair: lateral borders cut into three blunt lobes (including the orbital angle) of equal size.................................... *S. lanatum.*

II. Carapace nearly square, its length being little less than its breadth between the antero-lateral angles: the inner border of the arm ends in an acute serrated lobe: a very finely pectinated ridge traverses the upper surface of the palm, fore and aft, close to the upper border: (a tooth on the lateral border of the carapace behind the orbital angle):—

1. Carapace deep, its sides nearly parallel: a transverse granular ridge on the inner surface of the palm: dactyli of the legs of good length:—

i. Upper border of movable finger of male with an elegantly milled crest of 40 to 60 fine lamellæ.. *S. tæniolatum.*

ii. Upper border of movable finger of male with a coarsely crenulate crest.............................. *S. tetragonum.*

2. Carapace shallow and depressed, its sides divergent posteriorly: no transverse granular crest on the inner surface of the palm: dactyli of the legs short: (a milled crest of about 25 very fine lamellæ on the upper border of the movable finger of the male)........ *S. Brockii.*

III. Carapace somewhat elongate (its length being decidedly more than its breadth at the antero-lateral angles), shallow and depressed:—

1. No tooth on the lateral border of the carapace behind the orbital angle: legs with remarkably broad meropodite and remarkably short propodite: upper border of movable finger of male with an elegantly milled crest of about 40 fine lamellæ.................................. *S. latifemur.*

2. Two teeth on the lateral border behind the orbital angle: movable finger without any milling:—

i. Post-frontal tubercles of the gastric region serrated: legs with meropodites of good breadth and dactyli of good length................ *S. politum.*

ii. Post-frontal tubercles smooth: legs with rather narrow meropodites and short dactyli............ *S. oceanicum.*

IV. The length of the carapace is just equal to its breadth at the antero-lateral angles: legs long and slender, with elongate dactyli:—

1. Carapace shallow, depressed, perfectly square, its sides quite parallel: two little teeth on the lateral border behind the orbital angle.............................. *S. Finni.*

2. Carapace deepish, its sides strongly divergent posteriorly where its breadth is much greater than its length: two teeth (not including the orbital angle)

on the lateral border, the posterior one being very small :—

i. Third pair of legs not three times the length of the carapace.. *S. longipes.*
ii. Third pair of legs more than three-and-a-half times the length of the carapace.................... *S. kraussi.*

97. *Sesarma quadratum* (Fabr.).

Cancer quadratus, Fabricius, Ent. Syst. Suppl. p. 341.

Ocypoda quadrata, Bosc, Hist. Nat. Crust. I. p. 198.

Ocypoda plicata, Latreille, Hist. Nat. Crust. &c. VI. p. 47.

Sesarma quadrata, Milne Edwards, Hist. Nat. Crust. II. 75, and Ann. Sci. Nat., Zool., (3) XX. 1853, p. 183.

Sesarma quadratum, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 302 : Miers, Phil. Trans. Vol. 168, 1879, p. 490.

Sesarma quadrata, Richters, in Mobius' Meeresf. Maurit. p. 157 : Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 217 : Lenz and Richters, Abh. Senck. Nat. Ges. XII. 188, p. 425 : de Man, Zool. Jahrb. Syst. II. 1887, p. 655, pl. xvii. fig. 2 and p. 683, and IV. 1889, p. 434, and IX. 1895–97, pp. 181, 182, and Notes Leyden Mus. XII. 1890, p. 99, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. p. 328 : Thallwitz, Abh. Mus. Dresden, 1890–91, No. 3, p. 37 : Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 392 : Ortmann, Zool. Jahrb. Syst. VII. 1893–94, p. 724.

Grapsus (Pachysoma) affinis, De Haan, Faun. Jap. p. 66, pl. xviii. fig 5.

Sesarma affinis, Krauss, Sudafr. Crust. p. 45 : Milne Edwards, Ann. Sci. Nat. Zool. (3) XX., 1853, p. 183 : Heller, Novara Crust. p. 62 : de Man, Notes Leyden Mus. II. 1880, p. 22 : Miers, Ann. Nag. Nat. Hist. (5) V. 1880, p. 312 : Kingsley, *l.c. supra*, p. 213 : Ortmann, *l.c. supra*, p. 724.

Sesarma ungulata : Milne Edwards, Ann. Sci. Nat., Zool. (3) XX. 1853, p. 184 : Kingsley, *l.c. supra*, p. 218.

Sesarma aspera, Heller, Novara Crust. p. 63, pl. vi. fig. 1 : Kingsley, *l.c. supra*, p. 214 : Müller, Verh. Nat. Ges. Basel, 1886, p. 476 : de Man, Zool. Jahrb. II. 1887, p. 656 and Journ. Linn. Soc. Zool. XXII. 1887–88, p. 169.

Sesarma melissa, de Man, Zool. Jahrb. Syst., II. 1887, p. 656, and Journ. Linn. Soc., Zool., XXII. 1888, p. 170, pl. xii. figs. 5–7, and Zool. Jahrb. Syst., IV. 1889, p. 434.

Carapace hardly convex, decidedly broader than long, its length being about four-fifths its breadth between the antero-lateral angles, deep ; the 4 post-frontal lobes prominent equal and a little rugose transversely, the rugæ being sparsely tufted with hair ; the cardiac and intestinal regions very much less distinct than the gastric : some oblique striations on the epibranchial regions.

Front decidedly more than half the greatest breadth of the carapace, not very deep, its free margin usually but slightly sinuous. Lateral borders of carapace nearly parallel, a little divergent anteriorly, without any tooth behind the acute orbital angle.

The chelipeds differ in the sexes, being about $1\frac{3}{4}$ times the length of the carapace in the male and much more massive than the legs, but in the female hardly $1\frac{1}{3}$ times the length of the carapace and not more massive than the legs. In both sexes the outer surface of the arm wrist and palm are granular, the granules on the arm and wrist having a squamiform arrangement, the inner border of the arm bears a subterminal spine of large size, the upper border of the arm ending in a much smaller spine, the inner angle of the wrist is not dentiform, and the inner surface of the palm is more or less granular. In the male the palm is a little swollen below and has, on its upper surface, some short oblique crests, of which two are most elegantly pectinated: in the female the palm is not swollen and the crests are simply granular. The dactylus is less than twice the length of the upper border of the hand (palm) and its dorsal surface is elegantly milled with from 11 to 19 blunt, rather coarse, transverse lamellæ: in the female this milling is incomplete and very indistinct. In neither sex is there any great gap between the closed fingers.

The meropodites of the legs are foliaceous, their greatest breadth in the 2nd and 3rd pairs being more than half their length, their anterior border ends at an acute subterminal spine, and their dorsal surface has some fine transverse squamiform sculpture. The anterior border of the last three joints of the legs, and part of the posterior border of the last two, is fringed with tufts of bristles. The 3rd pair of legs, which are slightly the longest, are about twice the length of the carapace, and their dactylus is about three-fourths the length of their propodite.

In the Indian Museum are 42 specimens from both coasts of the Peninsula, Ceylon, the Andamans and the Nicobars.

In a male of good size the carapace is 16 millim. long and 20 millim. broad.

98. *Sesarma pictum*, De Haan.

Grapsus (Pachysoma) pictus, De Haan, Faun. Japon. Crust. p. 61, pl. xvi. fig. 6.

Sesarma picta, Krauss, Sudafr. Crust. p. 45: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 184: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 106: de Man. Notes Leyden Mus. II. 1880, p. 22, and Zool. Jahrb., Syst., II. 1887, p. 657, and IX. 1895–97, pp. 181, 182, and Journ. Linn. Soc., Zool., XXII. 1888, p. 171: Bürger, Zool. Jahrb., Syst., VII. 1893–94, p. 626: Ortmann, Zool. Jahrb., Syst., VII. 1893–94, p. 725.

Agrees with *S. quadratum* in everything but the following particulars:—

(1) the carapace is not so broad, its length being about five-sixths of its breadth between the antero-lateral angles:

(2) the front is not so broad, its extent being only half the breadth of the carapace:

(3) the meropodites of the legs are not so broadly foliaceous, their greatest breadth, in the middle two pairs, being less than half their length.

The Indian Museum possesses a single specimen from Mergui.

99. *Sesarma bidens* (De Haan).

Grapsus (Pachysoma) bidens, De Haan, Faun. Japon. Crust. p. 60, pl. xvi. fig. 4, and pl. xi. fig. 4.

Sesarma bidens, Dana, U. S. Expl. Exp. Crust. pt. I. p. 353: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 185: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 105: Heller, Novara Crust. p. 64: Hilgendorf, in v. d. Decken's Reisen Ost-Afr., Crust., p. 91, pl. iii. fig. 3*a*: Hoffmann, in Pollen & Van Dam, Faun. Madag. Crust. p. 24: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 313, and Zool. H. M. S. Alert, pp. 184, 246: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 214: de Man, Notes Leyden Mus. II. 1880, p. 28, and Zool. Jahrb., Syst., II. 1887, p. 658, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. p. 330: Lenz & Richters, Abh. Senck. Nat. Ges. XII. 1881, p. 425: Bürger, Zool. Jahrb., Syst., VII. 1893-94, p. 628: Ortmann, *ibid.* p. 726: Nobili, Ann. Mus. Genova (2) XX. 1899, p. 269.

Sesarma Dussumieri, Milne Edwards, *l. c. supra*: Tozzetti "Magenta" Crust. p. 145, pl. ix. figs. 3 *a-f*: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 215: de Man, Zool. Jahrb. Syst. II. 1887, p. 659, and IX. 1895-97, p. 208, and Journ. Linn. Soc., Zool., XXII. 1888, p. 177, pl. xii. figs. 8-12: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 726.

Sesarma lividum, A. Milne Edwards, Nouv. Archiv. du Mus., V. 1869, Bull. p. 25, and IX. 1873, p. 303, pl. xvi. fig. 2: Brocchi, Ann. Sci. Nat., Zool., (6) II. 1875, Art. 2, p. 83 (*male appendages*): Kingsley, *tom. cit. supra*, p. 216: de Man, Archiv. f. Naturges. LIII. 1887, i. p. 381, pl. xvii. fig. 1, and Zool. Jahrb. Syst. II. 1887, p. 659, and Journ. Linn. Soc., Zool., XXII. 1888, p. 180.

Sesarma Haswelli, de Man, Zool. Jahrb., Syst., II. 1887, p. 658, and Journ. Linn. Soc., Zool., XXII. 1888, p. 175.

This species very closely resembles *S. quadratum*, from which it differs in the following characters:—

(1) there is a small sharp tooth on the lateral border of the carapace, immediately behind the outer orbital angle:

(2) the carapace is slightly less transverse (though decidedly broader than long):

(3) the transverse ridges on the upper surface of the dactylus of the male chelæ are coarser and shorter and more tubercle-like.

In the Indian Museum are 52 specimens from the coasts of the Bay of Bengal, Andamans, Nicobars and Ceylon.

100. *Sesarma Edwardsi*, de Man.

Sesarma Edwardsi, de Man, Zool. Jahrb., Syst., II. 1887, p. 649, and Journ. Linn. Soc., Zool., XXII. 1888, p. 185, pl. xiii. figs. 1–4: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 721.

Differs from *S. quadratum* in the following particulars :—

(1) the carapace is squarer and less transverse, and the four post-frontal lobes of the gastric region are more prominent; the front also is slightly, but distinctly, broader:

(3) there is a sharp tooth on the lateral border of the carapace immediately behind the antero-lateral angle:

(3) the upper border of the arm does not end in a spine, and though there may be a slight subterminal dilatation of the crenulated inner border of the arm there is *no large spine :*

(4) there is a *sharp tooth or spine just below the inner angle of the wrist :*

(5) the upper surface of the wrist and outer surface of the palm are covered—usually very closely covered—with vesiculous tubercles; and there are smaller and sharper tubercles on the upper surface of the dactylus and the lower surface of the fixed finger of the chelæ:

(6) there are no oblique pectinated crests on the palm:

(7) *the male abdomen is singularly broad.*

In the Indian Museum are 126 specimens, most of which came from the Burma coast from Arakan to Tavoy, the rest from the Gangetic delta, the Andamans and Ceylon.

In the variety separated by de Man as *crassimana* the abdomen is not quite so broad as it is in the typical form, and the palm of the male is larger and more swollen.

101. *Sesarma intermedium* (De Haan).

Grapsus (*Pachysoma*) *intermedius*, De Haan, Faun. Japon. Crust. p. 61, pl. xvi. fig. 5.

Sesarma intermedia, Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 186: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 105: Heller, Novara Crust. p. 64: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 216: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 314: de Man, Notes Leyden Mus. II. 1880, p. 25, and Zool. Jahrb., Syst., II, 1887, p. 649, and Journ. Linn. Soc., Zool., XXII. 1888, p. 182: Ortmann, Zool. Jahrb. Syst. VII. 1893–94, p. 721.

Differs from *S. quadratum* in the following particulars :—

(1) the carapace is more quadrate and less transverse, the post-frontal lobes are less prominent and much smoother, and the front is broader:

(2) there is a tooth—and sometimes also a second rudimentary tooth—on the lateral border immediately behind the orbital angle:

(3) there is no large subterminal spine on the inner border of the arm, nor does the upper border end in a spine:

(4) in the corner of the upper surface of the palm there are in the male some oblique granular lines, but no pectinated crests; and on the inner surface of the palm there is a conspicuous transverse granular crest:

(5) the upper surface of the dactylus of the male chelæ is granular in its proximal half, but is not milled with transverse lamellæ.

From *S. Edwardsi* it is distinguished by numerous characters, but the absence of a spine at the inner angle of the wrist is sufficiently characteristic.

In the Indian Museum are 5 specimens from Mergui.

102. *Sesarma Meinerti*, de Man.

Sesarma Meinerti, de Man, Zool. Jahrb., Syst., II. 1887, pp. 648, 668, and IX. 1895–97, p. 166: Bürger, Zool. Jahrb. Syst. VII. 1893–94, p. 617, and Ortmann, *ibid.* p. 720.

Sesarma tetragona, Edw. (*nec* Fabr.), Milne Edwards, Hist. Nat. Crust. II. 73, and Ann. Sci. Nat., Zool., (3) XX. 1853, p. 184: A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71, and IX. 1873, p. 304, pl. xvi. fig. 4: Hilgendorf, in v. d. Decken's Reisen Ost-Afr., Crust. p. 90: Hoffmann, in Pollen & Van Dam, Faun. Madag. Crust. p. 23: Hilgendorf, MB. Ak. Berl. 1878, p. 809: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 218.

Carapace convex, especially fore and aft, a little broader than long, deep: the 4 post-frontal lobes prominent, unequal—the outer ones being much narrower than the middle pair; the cardiac and intestinal regions are quite distinct, and the usual oblique striations are found on the epibranchial regions: the whole dorsal surface of the carapace is rather profusely covered with tufts of hair.

Front decidedly more than half the greatest breadth of the carapace, which is just behind the orbital angles, not very deep, its free edge sinuous. Lateral borders of the carapace somewhat sinuous, armed with a large tooth behind the orbital angle: there may even be a trace of a second epibranchial tooth.

Chelipeds subequal, almost equally massive in both sexes, about twice as long as the carapace. The outer surface of the arm and wrist is finely rugose, that of the palm is only pitted: neither the upper nor the inner border of the arm end in a tooth: inner angle of wrist pronounced but not dentiform: no pectinated crests of any kind on the palm: the fingers are a good deal arched and meet only at tip, the upper surface of the dactylus in the male has a row of inconspicuous denticles: on the inner surface of the palm there is an oblique granular crest.

The meropodites of the legs are foliaceous, but their breadth is not twice their length; but otherwise the legs are as in *S. quadratum*.

The abdomen of the male is decidedly narrow.

In the Indian Museum are 26 specimens from the Andamans and one from Madras. The carapace of a large one is 33 millim. long and 38 millim. broad: in the female the carapace is not so broad.

103. *Sesarma Andersoni*, de Man.

Sesarma Andersoni, de Man, Zool. Jahrb., Syst., II. 1887, p. 657, and Journ. Linn. Soc. Zool. XXII. 1888, p. 172, pl. xii. figs. 1–4.

Carapace moderately deep, hardly convex, considerably broader than long, the four post-frontal lobes of the gastric region only moderately prominent, nearly equal, pitted; the cardiac and intestinal regions faintly indicated; the oblique striations of the epibranchial regions very sharp and distinct, one of them almost projects beyond the lateral border as a tooth behind the orbital angle.

Front more than half the greatest breadth of the carapace, not very deep, its free margin a little convex but nearly straight. The lateral borders of the carapace are slightly convergent posteriorly: except for the afore-mentioned projection of the first branchial ridge there is no tooth behind the orbital angle.

Chelipeds much larger in the male than in the female, but the difference is not so marked as in *S. quadratum*. The inner border of the arm ends in a very acute denticulated lobe: the palm is traversed on the outer surface, near the lower border, by a fine raised line, and on the upper surface in the male are numerous short parallel oblique striæ one of which at least is most elegantly pectinate: in the female these crests are less numerous and less distinct: the upper surface of the dactylus of the male is milled, the lamellæ increasing in size and coarseness from behind forwards.

At the distal end of the posterior border of the meropodites of the legs are three or four strong spines, decreasing in size from behind forwards, but there is no subterminal spine on the anterior border: in other respects, except that the dactyli are slightly shorter, the legs are very similar to those of *S. quadratum*. The male abdomen is broad.

In the Indian Museum are 8 specimens from Mergui: the carapace of the largest is 7 millim. long and 9 millim. broad.

104. *Sesarma lanatum*, n. sp.

Carapace deepish, dorsally flat, everywhere covered, as also are the appendages, with a dense fur amid which are freely scattered little dense adherent tufts of hair resembling tubercles. When this covering is removed the surface of the carapace is smooth and polished, with the gastric region and its four post-frontal tubercles distinct.

The length of the carapace is considerably less than its breadth between the antero-lateral angles.

Front a little more than half the breadth of the carapace, obliquely deflexed, its free margin nearly straight. The lateral borders of the carapace are nearly parallel and anteriorly are cut into three blunt lobes of nearly equal size—including the outer orbital angle.

The chelipeds when denuded have a smooth surface and sharp borders: they are similar in the two sexes, except that they are much more massive in the male. There is a blunt angular projection at the far end of the inner border of the arm, the inner angle of the wrist is pronounced but not dentiform, and the upper border of the palm is traversed fore and aft by a fine sharp crest: in the male the palm is at least as high as long: the upper border of the dactylus is faintly crenulate in its proximal two-thirds.

The meropodites of the legs are foliaceous, but their breadth is less than half their length: their borders are entire. The dactyli of the legs are claw-like, their length being about three-fourths that of the propodites.

The abdomen of the male is narrow.

In the Indian Museum are 4 specimens from Bombay and Karachi: the carapace of the largest is 8½ millim. long and 10 millim. broad.

105. *Sesarma tæniolatum*, White.

Sesarma tæniolatum, White, List Crust. Brit. Mus. p. 38 (1847): Miers, P. Z. S. 1877, p. 137, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 313: de Man, Notes Leyden Mus. II. 1880, p. 26: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 218: de Man, Zool. Jahrb., Syst., II. 1887, pp. 647, 666, and IX. 1895–97, p. 166, and Journ. Linn. Soc., Zool., XXII 1888, p. 181, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. p. 330: Bürger, Zool. Jahrb., Syst., VII. 1893-94, p. 615, and Ortmann, *ibid.* p. 720.

Sesarma Mederi, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 185: Tozzetti, "Magenta" Crust. p. 136, pl. ix. figs. 1 *a*–*i*.

Carapace deep, nearly flat dorsally, square, its length being slightly less than its breadth between the antero-lateral angles. All the regions are quite well defined, and the 4 post-frontal tubercles—the middle two of which are not very much broader than the outer ones—are very prominent. The whole dorsum of the carapace is covered with tufts of hair, which are largest and longest anteriorly. There are some oblique striæ on the sides of the epibranchial regions.

Front half, or a little more than half, the breadth of the carapace, not very deep, its free margin strongly sinuous. Lateral borders of the carapace nearly parallel, armed with one acute tooth behind the acute outer orbital angle.

The chelipeds are similar in the two sexes, except that they are a good deal more massive and more sharply sculptured in the male. They are not quite twice the length of the carapace: the outer surface of the arm and wrist are granular-rugose, the outer surface of the palm is granular, and there is a transverse granular ridge on the inner surface of the palm: the upper border of the arm is crest-like and ends in a sharp tooth, and the distal end of the inner border forms an acute angular serrate lobe: the inner angle of the wrist is dentiform: close to and nearly parallel with the upper border of the palm runs a fine and very finely and evenly pectinate crest: along the upper border of the dactylus runs a very elegantly milled crest of from 40 to 60 fine teeth. In the male the palm is at least as high as long, the fingers meet only at tip, and the dactylus is about twice the length of the upper border of the palm.

The meropodites of the legs are foliaceous, but their greatest breadth is not quite half their length: there is a sharp subterminal spine on their anterior border only. The dactyli of the legs are two-thirds, or more, the length of the propodites. The 3rd pair of legs, which are the longest, are a little more than twice the length of the carapace.

In the Indian Museum are 9 specimens, from Mergui, the Andamans, and Penang. The carapace of a large specimen is nearly 38 millim. long and nearly 40 broad.

106. *Sesarma tetragonum* (Fabr.).

Cancer tetragonus, Fabricius, Ent. Syst., Suppl. p. 341.

Cancer fascicularis, Herbst, Krabben etc. III. i. 49, pl. xlvii. fig. 5.

Sesarma tetragona, de Man, Zool. Jahrb., Syst., II. 1887, p. 646: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 392.

This species closely resembles *S. tæniolatum*, from which it differs in the following characters:—

(1) the carapace is slightly broader:

(2) the subterminal lobe of the inner border of the arm is smaller, while the tooth at the inner angle of the wrist is more pronounced:

(3) the fine striated crest along the upper border of the palm is shorter:

(4) the crest of the upper surface of the movable finger of the chelæ is coarsely crenulate.

In the Indian Museum are 8 specimens from Ceylon, Madras, the Mahanaddi Delta, and the Ganges Delta. The carapace of a large one is 40 millim. long and 43 millim. broad.

107. *Sesarma Brockii*, de Man.

Sesarma Brockii, de Man, Zool. Jahrb., Syst., 1887, p. 651, and IX. 1895–97, p. 171, and Archiv f. Naturges. LIII. 1887, i. p. 373, pl. xvi. fig. 3: Thallwitz, Abhand. Zool. Mus. Dresden, 1890–91, No. 3, p. 39: Ortmann, Zool. Jahrb., Syst., VII. 1893–94, p. 721.

Resembles *S. tæniolatum*, but differs in the following characters:—

(1) the carapace is *shallow* and much depressed, its length is just equal to its breadth between the antero-lateral angles, its dorsal surface is not so hairy, and its sculpture though similar is not so deeply cut: the front is not so sinuous.

(2) the lateral borders of the carapace are *slightly divergent* posteriorly, and there are *two* teeth—the posterior of which is, however, extremely small—behind the outer orbital angle:

(3) no subterminal spine on the upper border of the arm: no transverse granular crest on the inner surface of the palm:

(4) the milled crest along the upper border of the dactylus of the chelæ is lower and has only about 25 teeth:

(5) the legs are longer, their meropodites are narrower and their dactyli—except in the case of the 1st pair of legs—are *barely half the length of their propodites.*

In the Indian Museum there is a young male from the Andamans. In this specimen the chelipeds are not massive and are very little longer than the carapace.

108. *Sesarma latifemur*, n. sp.

Closely related to *S. elongatum*, A. M. Edw.

This species belongs to the same natural group as *S. tæniolatum*, from which it differs only in the following characters:—

(1) the carapace is *shallow* and much depressed, and its length is decidedly *more* than its breadth between the antero-lateral angles, its dorsal surface is not quite so hairy and its post-frontal lobes are deeper cut:

(2) the lateral borders of the carapace are decidedly *divergent* posteriorly and have no tooth behind the orbital angle:

(3) the male chelipeds are little longer than the carapace: the crest-like upper border of the arm does not end in a spine: the inner

angle of the wrist, though well pronounced, is not spiniform: the transverse beaded ridge on the inner surface of the palm is very short:

(4) the dactylus of the chelæ is not nearly twice the length of the upper border of the palm, and the milled crest on its upper surface consists of not more than 40 teeth:

(5) the meropodites of the legs are remarkably foliaceous, their greatest breadth, in the case of the 2nd and 3rd pairs, being more than half their length: all the leg joints are thinner and flatter:

(6) the dactyli of the legs are remarkably short, their length, in the case of the 2nd and 3rd pairs, being *less than half* the length of their propodites.

In the Indian Museum is a single male from the Andamans: its carapace is nearly 35 millim. long, and a little over 30 millim. broad across the antero-lateral angles.

109. *Sesarma politum*, de Man.

Sesarma polita, de Man, Zool. Jahrb. Syst. II. 1887, p. 654: Journ. Linn. Soc., Zool., XXII. 1888, p. 189, pl. xiii. figs. 7–9.

Carapace shallow and much depressed, a good deal longer than broad, all the regions well defined: the four post-frontal lobes of the gastric subregions are deep-cut and very prominent, their anterior overhanging edges are serrated and their surface bears some transversely arranged sharpish tubercles: the two middle lobes are decidedly larger than the outer ones. There are no oblique striæ on the epibranchial regions.

Front more than half the breadth of the carapace, its free margin markedly sinuous. The lateral borders of the carapace are nearly parallel though slightly sinuous: there are two well cut teeth behind the outer orbital angle.

Chelipeds equal, and not so very much longer than the carapace: the outer surface of the arm wrist and hand are closely beset with small tubercles, which in places have a squamiform look, and the inner surface of the palm is granular but has no transverse ridge: the inner and outer borders of the arm, the inner border of the wrist, and the upper border of the palm and movable finger are conspicuously serrulate, and there is also a noticeable dilatation near the far end of the inner border of the arm. There are no pectinated crests of any sort on the palm, and the fingers—both surfaces of which are smooth and polished—have no large gap between them when closed.

The legs are shortish, the 3rd pair being hardly 1⅔ times the length of the carapace, and rather slender. The meropodites are nearly three times as long as broad, they have a subterminal spine on the anterior border and in the case of the 1st pair their posterior border is distinctly serrulate. The dactyli are rather short, their length, in the third pair, being less than two-thirds the length of the propodite: they are remarkably tomentose.

In the Indian Museum there is a single specimen from Mergui: its carapace is 38 millim. long and 35 millim. broad.

110. *Sesarma oceanicum*, de Man.

Sesarma oceanica, de Man, Zool. Jahrb., Syst., IV. 1889, p. 429, pl. x. fig. 9, and Notes Leyden Mus. XIII. 1891, p. 52.

Carapace shallow, depressed, its length greater than its breadth between the antero-lateral angles; all the regions are fairly well defined and the 4 post-frontal lobes of the gastric subregions are prominent, the middle pair being more than twice as broad as the two outer ones: the surface of the carapace is granular anteriorly and punctate posteriorly, and near the sides are numerous short oblique striæ.

Front half the breadth of the carapace, deepish, its free margin a a little sinuous: orbits not at all oblique: the lateral borders of the carapace have a slight, but distinct, convex curve, and there are two teeth—the posterior of which is extremely small—behind the outer orbital angle.

Chelipeds equal, not much longer than the carapace: the outer surface of the arm and wrist are rugose and both surfaces of the palm are studded with sharpish granules: there is a small angular lobe near the far end of the inner border of the arm, and the inner angle of the wrist is dentiform: the palm is not quite as high as long, close to and nearly parallel with its upper border is a fine and finely granular ridge: the dactylus is about half as long again as the upper border of the palm, and there are some sharpish granules along its upper surface.

The legs are slender: their meropodites are more than three times as long as broad and are not foliaceous, they have a subterminal spine on the anterior border only: their dactyli are shortish, those of the 3rd pair being less than two-thirds the length of their propodites, and are densely plumed: the 3rd pair of legs are about 2⅓ times the length of the carapace.

In the Indian Museum is a single specimen from the Nicobars: its carapace is 20 millim. long, and 16·5 millim. across the antero-lateral angles.

111. *Sesarma Finni*, n. sp.

Near *S. maculata*, de Man.

Carapace shallow, depressed, flat, perfectly square, its length being equal to its breadth at the antero-lateral angles and its sides being parallel: the regions are indicated, but not emphasized, and the 4 post-frontal lobes are sharply prominent, the middle pair being much broader than the outer ones.

Front half the breadth of the carapace, deepish, its free edge nearly straight: two little teeth on the lateral border of the carapace, behind the outer orbital angle.

In the chelipeds of the female the outer surface of the arm wrist and hand are granular; the upper border of the arm ends acutely, and the inner border ends in a spine; the inner angle of the wrist is pronounced, but is not dentiform; and the upper surface of the palm is traversed, fore and aft, close to the upper border, by a fine and finely milled ridge.

Legs long and slender, the 3rd pair being more than 2½ times the length of the carapace: their meropodites are not foliaceous, being about three times as long as broad, and they have a subterminal spinule on the anterior border only: their dactyli are long and slender, those of the 3rd pair being more than three-fourths the length of the propodite: the propodites and dactyli of all the legs are fringed with short stiff sharp bristles.

The species is represented by a small female from the Andamans: its carapace is not quite 11 millim. in either diameter.

112. *Sesarma longipes*, Krauss.

Sesarma longipes, Krauss, Sudafr. Crust. p. 44, pl. iii. fig. 2: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 199: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 216: de Man, Zool. Jahrb., Syst., II. 1887, p. 651.

The length of the carapace is equal to its breadth at the antero-lateral angles, but as the lateral borders of the carapace diverge considerably, from before backwards, the *greatest* breadth of the carapace (at the level of the 2nd pair of legs) is considerably more than the length.

Carapace deepish, very slightly convex; its regions are not very well defined, but the median longitudinal groove of the gastric region is deep, and the 4 post-frontal lobes are sharply prominent, the middle pair being much broader than the outer ones.

Front half the extent of the anterior border of the carapace, the free margin slightly sinuous: the divergent lateral borders of the carapace have a tooth of good size behind the outer orbital angles.

Chelipeds in the female not half as long again as the carapace: the outer surface of the arm and wrist are rugulose, and both surfaces of the palm are studded with sharpish granules: the upper border of the arm ends acutely, but there is no spine at the end of the inner border; the inner angle of the wrist is pronounced, almost dentiform; there are no granular or pectinated crests of any kind on the palm: the fingers are little bent and leave no large gap between them when closed, there are some sharpish granules along the upper border of the dactylus, and along the lower border of the fixed finger.

The legs are remarkably uneven in length, the third pair being more than $2\frac{1}{2}$ times the length of the carapace; the meropodites are not exactly foliaceous, their greatest breadth being hardly two-fifths of their length, and they have a subterminal spine on the anterior border only; the dactyli are remarkably long, those of the third pair being as long as their propodites.

In the Indian Museum are 2 females from the Andamans: the carapace of the larger one is 18 millim. long and 20 millim. in its greatest breadth posteriorly.

113. *Sesarma Kraussi*, de Man.

Sesarma Kraussi, de Man, Zool. Jahrb., Syst., II. 1887, p. 652, and Journ. Linn. Soc., Zool., XXII. 1888, p. 193, pl. xiv. figs. 1–3.

Differs from *S. longipes*, which it closely resembles, in the following characters:—

(1) the four post-frontal lobes are not so prominent, the outer ones, indeed, being very inconspicuous:

(2) the free edge of the front is more sinuous, owing to the depth of the median notch:

(3) there are two distinct teeth on the lateral border of the carapace, behind the outer orbital angle:

(4) the outer surface of the wrist and both surfaces of the palm are nearly smooth, and there is a row of sharp granules along the *outer* surface of the fixed finger: the upper border of the arm does not end acutely:

(5) the legs are even longer and slenderer, the 3rd pair being more than $3\frac{1}{2}$ times the length of the carapace: the meropodites of the legs are at least 3 times as long as broad.

In the Indian Museum is a single male from the Nicobars: its carapace is 9 millim. long and 11 millim. in greatest breadth.

Heller ("Novara" Crust. pp. 64, 65) includes the following species in the Indian fauna:—

S. Eydouxi, Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. p. 184 (Madras).

S. indica, Milne Edwards, *tom. cit.* p. 186 (Ceylon, Nicobars).
S. gracilipes, Milne Edwards, *tom. cit.* p. 182 (Nicobars).

SARMATIUM, Dana.

Sarmatium, Dana, Silliman's Amer. Journ. Sci. (2) XII. 1851, p. 288, and Proc. Ac. Nat. Sci. Philad. 1851, p. 251, and U. S. Expl. Exp. Crust. pt. I. p. 357: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 212: de Man, Zool. Jahrb., Syst., II, 1887, p. 659.

Metagrapsus, Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 188.

This genus, which I almost agree with Dr. de Man in regarding as only a subgenus of *Sesarma*, differs from *Sesarma* in the following particulars:—

(1) the front, instead of being abruptly and vertically deflexed, is gradually declivous and obliquely deflexed:

(2) the antero-lateral borders of the carapace are usually a little arched, instead of being in the same straight line with the postero-lateral borders:

(3) the abdomen of the male does not completely coincide with the breadth of the sternum at the level of the 5th pair of legs; and in the female the terminal segment is not deeply impacted in the penultimate segment.

Distribution: West Indies, West coast of Africa, Indo-Pacific.

114. *Sarmatium crassum*, Dana.

Sarmatium crassum, Dana, Proc. Ac. Nat. Sci. Philad. 1851, p. 251; U. S. Expl. Exp. Crust. pt. I. p. 358, pl. xxiii. figs. 1 *a–d*: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 189: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 212: de Man, Zool. Jahrb. Syst. II. 1887, p. 660.

Carapace deep, broader than long, broader behind than in front, smooth, with very faint indications of regions and no oblique striæ on the epibranchial regions: of the post-frontal lobes the two middle ones alone are distinct, and they are not prominent, they occupy almost all the space between the orbits.

The front is half the extent of the anterior border of the carapace, its free edge is very little concave in the middle line. The antero-lateral borders of the carapace are distinctly arched and are cut into 2 broad blunt lobes (one of which is the orbital angle) followed by a small tooth.

Chelipeds "of male short, hand above transversely four to five-plicate, externally nearly smooth, moveable finger with four short rudiments of spines, carpus mostly smooth, a few seriate granules above." In the female the transverse plications of the upper surface of the hand are very indistinct and the dactylus is smooth.

Legs not much compressed: the meropodites are not broadened, there is a spinule at the distal end of their anterior border: the dactyli are slender but are shorter than the propodites.

In the Indian Museum is a young female from the Nicobars: its carapace is 8 millim. long and 9 broad.

Henderson (Trans. Linn. Soc., Zool., (2) V. 1893, p. 393) describes a variety of *Sarmatium indicum* (Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 174, pl. xxvi. figs. 1–5) from Cochin.

METASESARMA, Edw.

Metasesarma, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 188: Kingsley, Proc. Acad. Nat. Sci. Philad. 1880, p. 211: de Man, Zool. Jahrb., Syst. IX. 1895–97, p. 128.

The most marked difference between this genus and *Sesarma*, which it closely resembles, is that the tooth at the inner angle of the orbit meets the thickened angle of the front, so as to completely exclude the antennæ from the orbit.

The regions of the carapace are not defined, and the post-frontal tubercles are inconspicuous: the front is vertically deflexed as in *Sesarma*, but is deeper and overhangs the epistome: the reticulate appearance of the pterygostomian and neighbouring regions is finer, closer, and more confused: the orbits are more open below: the antennæ are much smaller: the legs are not so broad and compressed.

The *Metasesarmata* are land and fresh-water crabs of the Indo-Pacific region.

115. *Metasesarma Rousseauxii*, Edw.

Metasesarma Rousseauxii, Milne Edwards, Ann. Sci. Nat., Zool. (3) XX. 1853, p. 188, and Archiv. du Mus. VII. 1855, p. 158, pl. x. figs. 1 *a-c*: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 211: de Man, Zool. Jahrb., Syst., IV. 1889, p. 439, and IX. 1895–97, p. 138, and X. 1898, pl. xxix. fig. 28, and in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. p. 350: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 392: Ortmann, Zool. Jahrb., Syst., VII. 1893–94, p. 717.

Sesarma Aubryi, de Man (*nec* A. M. Edw.), Journ. Linn. Soc., Zool., XXII. 1888, p. 168.

Carapace deepish, a little broader than long, smooth to the naked eye, slightly convex fore and aft: a short semilunar groove separates the gastric from the cardiac region, and there is a median longitudinal post-frontal groove of some depth: the middle pair of post-frontal tubercles are distinct, though not prominent, but the outer ones are hardly distinguishable.

Front a little more than half the breadth of the carapace, vertical, deep, somewhat spathulate, the free edge convex and very slightly sinuous.

Sides of the carapace slightly curved and convergent posteriorly, no tooth behind the outer orbital angle.

The chelipeds are longer and more massive in the male, but are otherwise similar in both sexes: in the male they are less than 1½ times the length of the carapace. To the naked eye they are smooth, except for a patch of vesiculous granules in the middle of the inner surface of the palm. The inner angle of the wrist is sharply pronounced, and the upper border of the palm and of the base of the dactylus have a few small blunt serrulations. The palm is as high as long, the dactylus is about 1½ times the length of the upper border of the palm, the fingers, though a little hollowed at tip, are subacute and have no gap between them when closed.

Legs rather slender, smooth and unarmed to the naked eye: the meropodites are not broadened: the dactyli are as long as their propodites and like them are fringed with dark spine-like bristles. The 3rd pair of legs, which are the longest, are less than twice the length of the carapace.

In the Indian Museum are 61 specimens from the Andamans and Nicobars, Mergui, Ganges Delta, Madras, and Minnikoy (Laccadives). Many of the specimens were taken on land, hiding under timber, in which situation their curious mottled coloration must be protective. The largest specimen has a carapace 14 millim. long by nearly 17 broad.

CLISTOCŒLOMA, A. M. Edw.

Clistocœloma, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 310: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 219.

Differs from *Sesarma* only in the following characters:—

(1) the tooth at the inner angle of the lower border of the orbit meets the front, as in *Metasesarma*, so as to completely exclude the antennæ from the orbit:

(2) the reticulation of the sidewalls of the carapace resembles that of *Sesarma*, but, on denudation, the lines of granules are found to be absent, so that the meshwork is made up of hairs entirely:

(3) the merus of the external maxillipeds is shorter.

From *Metasesarma* this genus is distinguished by the lobulation of the dorsum of the carapace and the dentate lateral borders.

If *Metasesarma* is to be classed as a subgenus of *Sesarma* as it has been, and with undoubted reason, by Dr. de Man, the same course might be taken with *Clistocœloma*.

116. *Clistocœloma balansæ*, Edw.

Clistocœloma balansæ, A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 311, pl. xvii. fig. 1.

The whole body and the appendages, except the tips of the dactyli of the legs, are everywhere covered with a dark dense adherent fur, amid which, on the dorsal aspect, are numerous clumps of tomentum that look like tubercles: the legs, in addition, have a shaggy fringe of coarse hair.

Carapace square, as long as broad, somewhat depressed: when denuded it is smooth and polished, with all the regions well defined and boldly and symmetrically lobulated, and the post-frontal lobes prominent, the outer ones being again subdivided into two tubercles.

Front much more than half the breadth of the carapace, nearly vertically deflexed, deepish, its free margin sinuous and turned up to form a trenchant horizontal edge.

The lateral borders of the carapace are cut, anteriorly, into three lobes including the outer orbital angle.

Chelipeds subequal, nearly similar in size in both sexes, not more massive than the legs, shorter even than the 1st pair of legs, which are little longer than the carapace. When denuded they are smooth, except that the upper surface of the wrist is a little lumpy: the inner border of the arm is a little convex distally, but does not expand into an undoubted lobe: the palm is higher than long, but is by no means swollen or massive, and in the male only its upper surface is traversed, obliquely fore and aft, as close as possible to the upper border, by a fine microscopically-pectinate crest: the fingers are subacute, though slightly hollowed at tip, and have no wide gap between them when closed, and the fixed finger is shorter and deeper than the dactylus, the dactylus is nearly twice as long as the upper border of the palm, and in the male its upper border is milled with about 14 or 15 lamellæ.

Legs markedly unequal: the third pair, which are the longest, are not quite twice as long as the carapace. In all, the meropodites are thin and broad, and the dactyli are not two-thirds as long as their propodites.

In the Indian Museum are a male and two females from the Nicobars. The carapace of the largest is 19 millim. in either diameter.

117. *Clistocœloma merguiense*, de Man.

Clistocœloma merguiensis, de Man, Journ. Linn. Soc., Zool., XXII. 1888, p. 195, pl. xiii. fig. 10, and Notes Leyden Mus. XII. 1890, p. 92: and Zool. Jahrb., Syst., IX. 1895–97, p. 339, and X. 1898, pl. xxxi. fig. 40.

This species differs from *C. balansæ* in the following particulars:—

(1) the carapace is decidedly broader than long, its lobulations are not nearly so bold and convex, and the outer post-frontal lobules may be entire:

(2) the free edge of the front is not turned up to form a trenchant horizontal crest, although it is well defined:

(3) the chelipeds of the male are far more massive than any of the legs; the inner border of the arm is dilated distally; the palm is a good deal swollen, the pectinate crest that traverses its upper surface is longer, and its inner surface is more granular; the fingers are more widely separated when closed, and the lamellar tubercles along the upper border of the dactylus are more numerous:

(4) it is a smaller species.

In the Indian Museum are 10 specimens from the Nicobars: the carapace of the largest egg-laden female is 10 millim. long and 12 broad.

METAPLAX, Edw.

Metaplax, Milne Edwards, Ann. Sci. Nat. Zool. (3) XVIII. 1852, p. 161.

Rhaconotus, Gerstaecker, Archiv f. Naturges. XXII. 1856, i. p. 140, and Kingsley, Proc. Ac. Nat. Sci. Philad., 1880, p. 213.

Metaplax, de Man, Journ. Linn. Soc., Zool., XXII. 1888, pp. 153–155.

Carapace quadrilateral, somewhat depressed, a good deal broader than long, the regions well or fairly defined and the cervical and branchial grooves distinct.

Front declivous, its breadth about a third or a fourth that of the carapace, the convexity of its free edge impinges on the epistome to help in forming the broad interantennulary septum.

Lateral borders of the carapace straight, or a little arched anteriorly, nearly parallel, cut into 4 or 5 teeth of which the last one or two are very inconspicuous. The posterior part of the sidewalls of the carapace with some hairs curving towards the incurrent branchial opening.

Orbits of good depth: their outer wall incomplete, their lower border crenulate: the eyes do not fill the orbits and the eyestalks are not prolonged.

The antennules fold nearly transversely: the septum between them is broad. The antennæ lie in the orbital hiatus, their basal joint is extremely short, their flagellum is of fair length.

Epistome short, but well defined and prominent: buccal cavern squarish: the external maxillipeds leave between them a large rhomboidal gap, in which the mandibles are exposed: a broad oblique groove, bounded internally by a line of hairs, runs from a point behind the antero-external angle of the ischium to the anterior edge of the merus: the merus is truncated, and the foliaceous propodite articulates near its antero-external angle.

The chelipeds differ very markedly in the sexes: in the female they are shorter and slenderer than the legs, but in the male they are longer and much more massive than the legs. In the male there is always a short oblique horny crest, either on or close to and parallel with, the inner border of the arm, as in many species of *Macrophthalmus:* it probably, as Dr. de Man suggests, is scraped against the lower border of the orbit to produce a musical sound.

Legs slender, the first and last pairs much shorter than the 2nd and 3rd pairs—the 3rd pair the longest.

The abdomen in the male does not quite cover the sternum between the bases of the last pair of legs: it may have all 7 segments distinct, or, rarely, the 3rd 4th and 5th segments may be fused together: in the female all 7 segments are separate and the 7th is small and deeply impacted in the 6th, as in *Sesarma.*

Distribution: Estuaries and mudflats of the Oriental littoral.

The species of *Metaplax* have many points of resemblance with the Ocypodoid genus *Macrophthalmus*, and this is all the more likely to lead to confusion as the two genera share the same habitat and have the same manner of life; but there is no doubt of the true position of *Metaplax* among the *Sesarminæ.*

Key to the Indian species of Metaplax.

I. Anterior border of carpi and propodites of legs spiny: chelipeds in the male 3 times the length of the carapace....... *M. crenulata.*

II. Anterior border of carpopodites and propodites of legs smooth: male chelipeds less than 3 times the length of the carapace:—

  1. Dactylus of chelæ of male without any prominent lobe on its dentary edge: chelipeds of male equal:—

    i. 3rd 4th and 5th abdominal segments fused together in the male.................................... *M. indica.*

    ii. All the abdominal segments separate:—

      a. Length of the carapace about three-fourths the breadth: orbital portion of lower border of orbit with 4 or 5 teeth... *M. dentipes.*

      b. Length of the carapace less than three-fourths the breadth: orbital portion of lower border of orbit with 9 or 10 teeth... *M. distincta.*

2. Dactylus of chelæ of male with a prominent lobe projecting on the dentary edge: chelipeds of male markedly unequal:—
    i. Palm of larger cheliped of male longer than high. *M. elegans.*
    ii. Palm of larger cheliped of male higher than long. *M. intermedia.*

118. *Metaplax indica*, Edw.

Metaplax indicus, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 161, and Archiv. du Mus. VII. 1855, p. 165, pl. xi. figs. 2–2c.

Carapace about two-thirds as long as broad, deepish, a little convex, its surface smooth, the regions and the cervical and epibranchial grooves faint.

Front about a third the greatest breadth of the carapace. Lateral borders of the carapace nearly straight, cut into 4 teeth, of which the first 2 are large, the 3rd very small, and the 4th very inconspicuous.

Lower border of the orbit of the male continued to the level of the first notch in the lateral border of the carapace, unevenly crenulate.

Chelipeds of the male equal, more than 2½ times the length of the carapace, smooth and unarmed, to the naked eye: arm long and slender, projecting far beyond the carapace, its musical crest is almost on the inner border, close to its proximal end: palm nearly twice as long as high, increasing in height from its proximal to its distal end: fingers slender, acute, not noticeably channelled and only moderately incurved, neither of them have any large lobes on their dentary edge, the dactylus is hardly shorter than the upper border of the palm, and though it is deflexed is not hooked.

Legs quite unarmed, the carpopodites and propodites of the two middle pairs remarkably tomentose: the third pair of legs are a little more than twice as long as the carapace.

The 3rd 4th and 5th abdominal segments of the male are fused together—though the sutures are not obliterated on either side, but only in the middle—to form a single piece.

In the female the chelipeds are very slender, quite smooth, a little longer than the carapace, and the lower border of the orbit is finely and evenly serrulate.

In the Indian Museum are a male and a female from Karachi: the carapace of the male is 10 millim. long and 14·5 millim. broad.

119. *Metaplax distincta*, Edw.

Metaplax distinctus, Milne Edwards, Ann. Sci. Nat., Zool., (3) XVIII. 1852, p. 162, pl. iv. fig. 27: de Man, Journ. Linn. Soc., Zool., XXII. 1888, p. 158, pl. x. figs. 7–9: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 391.

Differs from *M. indica* in the following characters :—

(1) the carapace is more than two-thirds—nearly three-quarters—as long as broad :

(2) the lower border of the orbit of the male is prolonged to the level of the second notch in the lateral border of the carapace, and its orbital portion is cut into 9 or 10 little, blunt, obscurely-bilobulate teeth, which decrease very regularly in size from within outwards :

(3) the chelipeds of the male are hardly 2½ times the length of the carapace ; the arm has denticulate borders—the inner border being a little dilated distally—and is not elongate and slender, its musical crest runs obliquely away from the inner border and is nearer to the middle of that border : the palm is only about half again as long as high : the fingers are obliquely-truncated and channelled at tip, the fixed finger has a lobe (though not a very large one) on its dentary edge, the dactylus is hardly shorter than the upper border of the palm and has a strong hook-like curve :

(4) the anterior border of the meropodites of the legs is armed, in the first and last pairs with a single subterminal spine, in the middle two pairs with several spines ; the tomentum on the carpopodites and propodites of the middle two pairs of legs is not so thick :

(5) the abdomen of the male consists of 7 separate segments.

In the Indian Museum are 8 specimens from Madras, Coconada, Mergui, and the Nicobars : the carapace of the largest male is 15 millim. long and 21 broad.

120. *Metaplax dentipes* (Heller).

Helice dentipes, Heller, Novara Crust. p. 62, pl. v. fig. 5 : Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 220.

Metaplax dentipes, de Man, Journ. Linn. Soc., Zool., XXII, 1888, p. 162, pl. xi. figs. 1–3.

This is little more than a large variety of *M. distincta*, from which it differs in the following particulars :—

(1) the carapace is less transverse, its length being slightly more than three-fourths of its breadth :

(2) the lower border of the orbit of the male is divided, in its orbital portion, into 4 or 5 blunt, broad, compressed teeth decreasing in size from within outwards, and each tooth has a little cusp at its outer end :

(3) in the chelipeds, the inner border of the arm is more dilated distally ; the lobe on the dentary edge of the fixed finger is not so convex, and the dactylus is as long as the upper border of the palm

and is not so strongly hooked; the dactylus also sometimes has an enlarged tooth—not a distinct lobe—near the middle of its dentary border:

(4) the anterior border of the meropodites of the legs is very often quite free from spines, but sometimes there are inconspicuous spinules where spines exist in *M. distincta*.

In the Indian Museum are 23 specimens from the banks of the Hooghly, the mud-flats of Arakan and Tenasserim, and Mergui. The carapace of a large male is a little over 21 millim. long and 29 millim. broad.

121. *Metaplax elegans*, de Man.

Metaplax elegans, de Man, Journ. Linn. Soc., Zool., XXII. 1888, p. 164, pl. xi. figs. 4–6, and Zool. Jahrb., Syst., VIII. 1894–95, p. 596.

Metaplax crassipes, de Man, in Weber's Zool. Ergebn. Niederl. Ost-Ind. II. 1892, p. 325, pl. xix. fig. 12 (*ipso teste*).

Resembles *M. indica* in the form of the carapace, but can be recognized by the following characters:—

(1) the groves of the carapace are fainter:

(2) the lower border of the orbit instead of being irregularly cut into dentiform lobules is very finely and regularly pectinate:

(3) the chelipeds in the male are not 2½ times as long as the carapace and are distinctly unequal, the hand of one being decidedly larger than its fellow: the arm is not elongate, its edges are granular, and its musical crest, which is very fine, stands at the middle of the inner border, running obliquely parallel with that border: the larger palm is only a little longer than high and its inner surface is granular, its fingers are obliquely truncate and strongly channelled, and both of them have a lobe near the middle of their dentary border, the dactylus also is strongly curved, at any rate in the larger hand:

(4) in the first pair of legs the meropodites have a single subterminal spine on the anterior border, in the 2nd pair there are from three to six spines, and in the 3rd and 4th pairs from seven to ten: moreover at the extreme distal end of the *posterior* border of the meropodites of the two middle pairs of legs there may be two or three spinules:

(5) the abdomen of the male is broader, and has all 7 segments separate.

In the Indian Museum are 32 specimens from the Godavari Delta and from Mergui: the carapace of the largest male is 10·5 millim. long and 16 broad.

122. *Metaplax intermedia*, de Man.

Metaplax intermedius, de Man, Journ. Linn. Soc., Zool., XXII. 1888, p. 166, pl. xi. figs. 7–9.

Differs from *M. indica* in the following characters:—

(1) In the male the lower border of the orbit is continued a little beyond the first notch in the antero-lateral border of the carapace, and at its inner end it is cut into a series of 5 or 6 little even teeth that decrease in size from within outwards, and then it gradually becomes minutely and regularly pectinate:

(2) the chelipeds of the male are markedly unequal, the difference in size being in the hand: their length is about $2\frac{1}{2}$ times that of the carapace: the arm is of no great length and is somewhat broadened across the middle, its edges are granular, and its musical crest lies in the middle of the inner border, close to and nearly parallel with that border: the palm has granular edges and is much compressed at its antero-inferior corner; in the larger cheliped *the hand is at least as high as long:* the fingers are obliquely truncated and strongly channelled; in the larger hand the dactylus is hooked and has a lobe on its cutting edge near the proximal end, while the fixed finger is broad, is thin and compressed at its basal end, and presents on its cutting edge a notch (corresponding with the lobe on the dactylus) followed by a high lobe that descends obliquely to the tip of the finger:

(3) near the far end of the anterior border of the meropodites of the legs is a spine:

(4) the abdomen of the male has all 7 segments distinct, and is rather broadly triangular.

In the Indian Museum are 11 specimens from the Godavari Delta, the Gangetic Delta and Mergui. The carapace of the largest male is $9\frac{1}{2}$ millim. long and 15 broad.

123. *Metaplax crenulata*, Gerstaecker.

Rhaconotus crenulatus, Gerstaecker, Arch. f. Naturges. XXII. i. 1856, p. 142, pl. v. fig. 5: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 213.

Metaplax crenulatus, de Man, Journ. Linn. Soc., Zool., XXII. 1888, p. 156, and Zool. Jahrb., Syst., IV. 1889, p. 439.

Carapace about three-fourths as long as broad, convex, with the regions well defined and the cervical and epibranchial furrows deep and coarse, its surface pitted.

Front about a fourth the greatest breadth of the carapace. Lateral borders of the carapace cut into five teeth, the edges of which are serrated; the anterior part of the lateral borders is distinctly arched.

The lower border of the orbit, in the male, extends beyond the first notch of the lateral border of the carapace, its inner end is sharp entire and sinuous, but all the rest of its extent is elegantly beaded.

Chelipeds of the male three times the length of the carapace, the borders of the wrist and hand, and the inner border of the wrist, sharply granular or serrulate: arm long and slender, somewhat dilated at its proximal end, the musical crest close to the proximal end and almost on the inner border: the palm gradually increases in height from behind forwards, its greatest height is about half its length, along the middle of its inner surface is a row of granules ending in a granular patch: fingers slender, acute, incurved, not channelled, the extreme length of the dactylus is only about three-fourths that of the upper border of the palm: there are no prominent lobes on the dentary edges of the fingers.

Both borders of the meropodites of the legs, as well as the anterior border of the carpopodites and propodites, are spinulate. The third pair of legs are nearly as long as the male chelipeds.

In the abdomen of the male, which is narrow, all 7 segments are distinct, the penultimate segment being square.

In the female the chelipeds are very slender and are about 1½ times the length of the carapace, and the lower border of the orbit is elegantly pectinate.

In the Indian Museum are 11 specimens from the Sunderbunds and Mergui. The carapace of the largest male is 30 millim. long and 40 broad.

Sub-family PLAGUSIINÆ, Dana.

PLAGUSIA, Latreille.

Plagusia (part), Latreille, Gen. Crust. et Ins. p. 33 (1806): Desmarest, Consid. Gen. Crust. p. 126 (part): De Haan, Faun. Japon. Crust. p. 31: Milne Edwards (part), Hist. Nat. Crust. II. 90, and Ann. Sci. Nat. Zool., (3) XX. 1853, p. 178: Miers, Ann. Mag. Nat Hist. (5) I. 1878, p. 148, and Challenger Brachyura, p. 271: Kingsley, Proc. Ac. Nat. Sci. Philad., 1880, pp. 189, 223.

Philyra, De Haan, *l.c. supra.*

Carapace subcircular, depressed, the antero-lateral borders toothed. The interorbital space is broad, being nearly a third the greatest breadth of the carapace; but there is no true front, so that the antennular fossæ, into which the antennules fold nearly vertically, are visible in a dorsal view as deep clefts in the anterior border of the carapace. The interantennular septum is broad. Orbits deep: the antennæ stand in the wide orbital hiatus, their flagellum is short.

Epistome short: buccal cavern squarish, its anterior border is crenate and projects strongly in a horizontal direction. The external maxillipeds do not meet across the buccal cavern, but the space between them, which is not very broad, is occluded by bristles: their merus is as broad as the ischium and carries the palp at its summit: *their exognath has no flagellum.*

Chelipeds and legs dorsally rugose. Chelipeds subequal: in the male they are more massive than the legs, and longer than those of the first and last pairs, in the female they are shorter and slenderer than any of the legs: the fingers are stout and have rounded hollowed-out tips.

Legs very stout, with broad massive meri and short stout serrated dactyli.

The abdomen of the male is triangular and rather broad: it covers all the sternum between the last pair of legs, and it may have all 7 segments distinct or the 3rd 4th and 5th fused. In the female the abdomen is broad and consists of 7 segments, but the 3rd 4th and 5th do not move independently of one another.

Distribution: all warm seas, and extending into the Mediterranean.

In habit the *Plagusiæ* to a certain extent resemble the *Grapsi*, dodging about rocks that are awash at high tide, and hiding in crannies when pursued. They also resemble *Varuna* in being able to make themselves at home on drift timber in the open sea. This will account for the very wide range of some of the species.

The presence of two species in the Mediterranean implies nothing, of itself, for they may very probably have been carried there by ships. On the "Investigator" one could always see a *Plagusia* adhering to the ship's side near the water-line.

124. *Plagusia depressa* var. *squamosa* (Hbst.).

? *Cancer depressus*, Herbst (*nec* Fabr.), Krabben &c. I. ii. 117, pl. iii. figs. 35 *a-b*.

Cancer squamosus, Herbst, I. ii. 260, pl. xx. fig. 113 (*v.* Hilgendorf, SB. Ges. Nat. Freunde, 1882, p. 24).

Plagusia squamosa, Latreille, Gen. Crust. p. 34, and Nouv. Dict. Hist. Nat. XXVI. p. 533, and (?) Encycl. Méthod. X. 1825, p. 145: Lamarck, Hist. Nat. Anim. Sans Verh. p. 246: Milne Edwards, Hist. Nat. Crust. II. 94: Krauss, Sudafr. Crust. p. 42: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 178: Heller, SB. Akad. Wien, XLIII. 1861, p. 363, and Novara Crust. p. 51: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 298: Richters, in Möbius, Meeresf. Maurit. p. 157: Hilgendorf, SB. Ges. Nat. Freunde, Berlin, 1882, p. 24.

Plagusia tuberculata, Lamarck, *l. c.* p. 247: Latreille, Encycl. Méthod. X. p. 146: Milne Edwards, *l. c.* p. 94: Miers, Ann. Mag. Nat. Hist. (5) I. 1878, p. 148: Haswell, Cat. Austral. Crust. p. 110: Müller, Verh. Ges. Basal, VIII. 1886, p. 476: de Man, Notes Leyden Mus. V. 1888, p. 168, and Zool. Jahrb., Syst., IX. 1895–97,

p. 358: Ortmann, Zool. Jahrb., Syst., VII. 1893–94, p. 730: M. J. Rathbun, P. U. S. Nat. Mus. XXI. 1898, p. 605.

Plagusia immaculata, Lamarck, *l. c.* p. 247: Miers, *l. c.*, p. 150, and Challenger Brachyura, p. 273, pl. xxii. fig. 1: Haswell, *l. c.*: de Man, Archiv für Naturges. LIII. 1887, i. p. 371: Cano, Boll. Soc. Nat. Napol. III. 1889, p. 246: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 391: Ortmann, *l. c.*: Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 271.

Plagusia depressa, Latreille (nec Fabr.), Encycl. Méth. X. 145: Milne Edwards, Hist. Nat. Crust. II. 93, and Ann. Sci. Nat., Zool., (3) XX. 1853, p. 179: Heller, Novara Crust. p. 51.

Plagusia orientalis, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 103, and Ann. Lyc. Nat. Hist. New York, VII. 1860, p. 231.

All the regions of the carapace are distinct, and the surface is covered with flat pearly or squamiform tubercles which are fringed anteriorly with little close-set bristles of uniform length.

The tubercles vary: sometimes they are prominent, sometimes depressed, and sometimes they are almost obsolete on the most convex portions of the carapace. The little fringes of bristles also vary: sometimes they fill all the space between the tubercles, somtimes they can only be made out with a lens, sometimes they are absent.

The antero-lateral border of the carapace is armed with four teeth (including the orbital angle) which decrease in size from before backwards. The epistome is prominent beyond the anterior border of the carapace and is usually cut into seven lobes.

The chelipeds of the adult male are massive and are about half again as long as the carapace, but in the female they are slender and only about as long as the carapace. The inner angle of the wrist is coarsely dentiform: the tubercles on the upper surface of the palm and dactylus are arranged in high relief in longitudinal rows, those on the outer surface of the palm—especially at the upper part of it—have a tendency to fall into transverse rows.

On the posterior edge of the dorsal surface of the basipodites of the legs is a subacute tooth or blunt lobe with entire edges, this tooth being most conspicuous in the 2nd and 3rd pair of legs: on the anterior border of the meropodites there is a single strong spine, subterminal in position: the upper surface of the carpopodites propodites and dactyli is traversed longitudinally by a dense strip of long bristles. The 3rd pair of legs, which are the longest, are not quite twice the length of the carapace.

In the Indian Museum are 31 specimens from the Bay of Bengal and Arabian Sea: many of them were taken from drift timber in the open sea. Old specimens are commonly encrusted with barnacles and acorn-shells. The largest specimen in the collection has a carapace 54 millim. long and 56 broad.

LIOLOPHUS, Miers.

Leiolophus, Miers, Cat. Crust. New Zealand, p. 46 (1876), and Ann. Mag. Nat. Hist. (5) I. 1878, p. 153.

Acanthopus, De Haan, Faun. Japon. Crust. p. 29: Dana, U.S. Expl. Exp. Crust. pt. I. p. 372: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 180 (*nom. præocc.*).

As in *Plagusia*, the antennæ fold nearly vertically in deep slits—visible in a dorsal view—cut in the anterior border of the carapace, the slits dividing the interorbital space into three deep lobes; and the exognath of the external maxillipeds has no flagellum.

The difference from *Plagusia* is as follows :—

The carapace is extremely flat and depressed—being quite disk-like—and is longer than broad: the interantennular septum is of no great breadth: the epistome is almost linear: the merus of the external maxillipeds is very small, being much narrower than the ischium, and is disposed obliquely in repose: the chelipeds and legs, though in places spiny, are not rugose: the legs are much slenderer, and though the meropodites are broad they are very thin: the copulatory organ of the male ends in a claw: finally, the exognath of the external maxillipeds is extremely short and slender.

As in the Indian species of *Plagusia*, the abdomen of the male consists of 5 segments, the 3rd 4th and 5th being fused. The abdomen of the female is similar in this respect to that of the male.

Distribution: as *Plagusia*, but not in the Mediterranean.

125. *Liolophus planissimus* (Hbst.).

Cancer planipes, Seba, Thesaurus III. p. 49, pl. xix. fig. 21 (1758).

Cancer planissimus, Herbst, Krabben &c. III. iv. 3, pl. lix. fig. 3 (1804).

Plagusia clavimana, Latreille, Gen. Crust. p. 34: Lamarck, Hist. Nat. Anim. Sans Vert., Crust., p. 247: Desmarest, Dict. Sci. Nat. XXVIII. p. 246: Latreille, Encycl. Méthod. X. p. 146: Desmarest, Consid. Gen. Crust. p. 127, pl. xiv. fig. 2: Milne Edwards, Hist. Nat. Crust. II. 92, and in Cuvier, Règne Animal, Crust. pl. xxiii. fig. 3: Hess, Archiv f. Nat. XXXI. 1865, i. p. 154: Desbonne et Schramm, Crust. Guadaloupe, p. 50: Richters in Möbius' Meeresf. Maurit. p. 157.

Plagusia serripes, Lamarck, *loc. cit.*: Latreille, Encycl. Méthod *loc. cit.*

Acanthopus planissimus, De Haan, Faun. Japon. Crust. p. 30: Dana, U. S. Expl. Exp. Crust. pt. I. p. 372: Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. p. 180: Heller, SB. Ak. Wien, XLIII. 1861, p. 364: Stimpson, Ann. Lyc. Nat. Hist. New York, VII. 1862, p. 232: Heller, Novara Crust. p. 51: A. Milne Edwards, Nouv. Archiv. du Mus. IX. 1873, p. 299: Brocchi, Ann. Sci. Nat., Zool., (6) II. 1875, Art. 2 (*male appendages*): Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 31 (*gastric teeth*).

Acanthopus clavimanus, Kranss, Sudafr. Crust., p. 42.

Acanthopus Gibbesi, Milne Edwards, Ann. Sci. Nat. Zool. *loc. cit.*

Leiolophus planissimus, Miers, Cat. Crust. N. Z. p. 46, and Ann. Mag. Nat. Hist. (5) I. 1878, p. 153, and P. Z. S. 1879, p. 38, and Zool. H. M. S. Alert, pp. 518, 545:

Filhol, Crust. N. Z., Miss. l'ile Campbell, p. 394 : Haswell, Cat. Austral. Crust. p. 112 : Müller, Verh. Ges. Nat. Basel, 1886, p. 476 : de Man, Arch. f. Nat. LIII. 1887, i. p. 372, and Notes Leyden Mus. XV. 1893, p. 287, and Zool. Jahrb., Syst., IX. 1895–97, p. 358 : Pocock, Journ. Linn. Soc., Zool., XX. 1890, p. 513 : Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 391 : Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 731 : Whitelegge, Mem. Austral. Mus. III. 1897, p. 139 : M. J. Rathbun, Ann. Inst. Jamaica, I. 1897, p. 36.

Carapace thin, disk-like, covered with little short bristles which, however, leave certain symmetrical raised linear patches bare : the meropodites of the legs are clad in the same way, and have two long bare stripes.

The front, the antennular and supra-orbital angles, and the epistome are all acutely spinous : the antero-lateral border of the carapace is armed with 4 acute spines : the middle of the upper border of the orbit is more or less serrate. The eyes are large and reniform.

The chelipeds vary according to age and sex, but the arm and wrist are always armed with spines ; the palm is smooth, nude, oval, and somewhat compressed ; and the fingers are short, blunt, and hollowed at tip. In the adult male the palms, or one of them, are remarkably deep.

The anterior border of the meropodites of all the legs is armed along its whole length with remarkably large and even spines, the posterior border ends in a spine : in the case of the first two meropodites there is a second row of spinules parallel with the anterior border, but this is very indistinct in the meropodites of the 3rd pair, and quite absent in those of the 4th.

The colour in life is dark green, the nude streaks being bright green. In the Indian Museum are 36 specimens from the Andamans, Ceylon, and Laccadives : the carapace of the largest is 23 millim. long and 21 broad.

Family GEOCARCINIDÆ, Dana.

Key to the Indian Genera.

I. Fronto-orbital border more than half the maximum breadth of the carapace : interantennular septum broad : epistome well defined and prominent : dactyli of legs with 4 rows of spines :—
    1. Buccal cavern not elongate : exognath of external maxillipeds without a flagellum : opposed edges of the basal joints of the 2nd and 3rd pairs of legs heavily fringed with hair much as in *Ocypoda* :—
        i. Antero-lateral borders of carapace dentate..... GRAPSODES.
        ii. Antero-lateral borders of carapace entire......... EPIGRAPSUS.

2. Buccal cavern elongate : exognath of external maxillipeds with a flagellum : no hairy fringe on the basal joints of the 2nd and 3rd pairs of legs.................... CARDIOSOMA.

II. Fronto-orbital border less than half the greatest breadth of the carapace : interantennular septum narrow : epistome ill-defined and sunken : dactyli of legs with 6 rows of spines : exognath of external maxillipeds without a flagellum.................... PELOCARCINUS.

Grapsodes, Heller.

Grapsodes, Heller, Novara Crust. p. 58 : Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, pp. 188, 197.

Carapace depressed, little broader than long, declivous anteriorly, the regions faintly indicated, the dorsal surface without ridges or wrinkles, the lateral borders well arched and irregularly dentate.

Front about half the width of the anterior border, or about a third the greatest breadth of the carapace, strongly deflexed, its free edge nearly straight.

Orbits small, shallow, the lower border is wanting except for the tooth at the inner angle. The antennules fold nearly transversely in fossæ which are widely open externally : interantennular septum very broad. Antennal flagella slender and very short, standing in the orbital hiatus.

Epistome of moderate length fore and aft. External maxillipeds having a rhomboidal gap between them, in which the mandibles are visible : the merus is narrower than, but about the same length as, the ischium, and is a little oblique : the palp, which though coarse is small, articulates at the antero-external angle of the merus.

Chelipeds in both sexes subequal : in the male they are very much more massive than the legs and longer than the first and last pairs : in the female they are relatively shorter and much less massive than in the male. The tips of the fingers are acute.

Legs stout, their joints are not particularly broad or compressed but have their edges armed with stout bristles : the dactyli are long, acute, and thorny. The 2nd and 3rd pair of legs are the longest, and between their bases is a recess fringed with hairs resembling that found in *Ocypoda* and *Gelasimus*, and probably indicating terrestrial or amphibious habits.

The abdomen in both sexes consists of seven segments, and in the male its base covers all the breadth of the sternum between the last pair of legs.

Distribution : Islands of East Indian Archipelago.

This genus is really identical with *Epigrapsus* (=*Nectograpsus*), from which it only differs in having the regions of the carapace even more indistinct, the lateral borders of the carapace entire, the male chelipeds remarkably unequal, and the dactylus of the legs alone hirsute.

126. *Grapsodes notatus*, Heller.

Grapsodes notatus, Heller, Novara Crust. p. 58, pl. v. fig. 2 : Miers, P. Z. S. 1877, p. 136 : J. S. Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 197 : de Man, Notes Leyden Mus. V. 1883, p. 160.

Carapace five-sixths as long as broad, the regions defined, though faintly, the surface smooth except sometimes for some granules near the lateral borders. The antero-lateral borders are cut into three shallow teeth or lobes behind which are some inconspicuous crenulations. On the line of flexion of the front are two eminences separated by a notch. Epistome and pterygostomian regions tomentose.

The chelipeds differ considerably in the sexes, though always smooth. In the adult male they are nearly twice the length of the carapace, the inner angle of the wrist is pronounced but not spiniform, the palm (which is as high as long) has a strong bulge at the infero-posterior angle, the dactylus (which is twice as long as the upper border of the palm) is much longer than the immobile finger and closes very obliquely, and there are two molariform teeth, one near the base of the dactylus, the other nearer the tip of the immobile finger.

In the female the chelipeds are hardly 1½ times the length of the carapace, the inner angle of the wrist is dentiform or spiniform, the palm is not enlarged or inflated, and the fingers are of nearly equal length, meet in the greater part of their extent, and are finely denticulated except near the tips.

The second pair of legs, which are the longest, are about twice the length of the carapace, the third pair are a little shorter than the second, and the first and last pair are about 1½ times the length of the carapace.

In the Indian Museum are 8 specimens from the Nicobars. The carapace of the largest male is 25 millim. long and 30 millim. broad, but a female is somewhat larger than this.

That this species is probably terrestrial is evidenced by the vaulted branchial cavities, and also by the folding of the membrane that lines them, which is practically the same as that of *Ocypoda*, *Cardiosoma*, and *Pelocarcinus*.

EPIGRAPSUS, Heller.

Epigrapsus, Heller, Verh. zool.-bot. Ges. Wien, XII. 1862, p. 522: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, pp. 188, 192: Miers "Challenger" Brachyura, p. 265.

Nectograpsus, Heller, Novara Crust. p. 56.

This genus is really identical with *Grapsodes*, from which it differs in no single point of importance.

The trivial characters that separate it from *Grapsodes* are the following:—

The regions of the carapace are hardly distinguishable, and the lateral margins are entire: the chelipeds in the male are markedly unequal, one of them being longer and vastly more massive than the legs, the other being hardly larger than those of the female (which resemble those of *Grapsodes*): though the legs resemble those of *Grapsodes* in proportions and in the singular length of the dactyli, they differ in having only the terminal joint hirsute.

Distribution: Islands of the East Indian Archipelago and Polynesia.

127. *Epigrapsus politus*, Heller.

Epigrapsus politus, Heller, Verh. zool.-bot. Ges. Wien, XII. 1862, p. 522: Kingsley, Proc. Ac. Nat. Sci. Philad. 1880, p. 192: Miers, Challenger Brachyura, p. 266: Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 703: de Man, Zool. Jahrb. Syst. IX. 1895-97, p. 79.

Nectograpsus politus, Heller, Novara Crust. p. 57, pl. v. fig. 3.

Carapace about seven-eighths as long as broad, perfectly smooth, the outer orbital angle not pronounced and the lateral margins entire in the adult. The line of flexion of the front is a little concave in the middle. Epistome and pterygostomian regions tomentose.

Chelipeds smooth, equal in the female, markedly unequal in the male. In the male the larger cheliped is more than twice the length of the carapace, the inner angle of the wrist is not pronounced, the palm is about as high as long and has a strong bulge at its postero-inferior angle, the dactylus is much longer than the immobile finger, and the dactylus has 2 or 3 small molariform teeth while the immobile finger has a single one.

In the female the chelipeds are little longer than the carapace, have the inner angle of the wrist pronounced, the palm not enlarged or inflated, and the fingers finely and inconspicuously toothed and nearly equal in length.

The smaller cheliped of the male is but little larger than those of the female.

Of the legs the 2nd pair are the longest, being twice the length of the carapace, and the 3rd pair are slightly shorter: the 1st pair are nearly $1\frac{1}{2}$ times, the 4th pair about $1\frac{1}{3}$ times the length of the carapace.

In the Indian Museum are 4 specimens, from the Andamans and Nicobars: the carapace of the largest male is 14 millim. long and 16 millim. broad.

Cardiosoma, Latreille.

Cardisoma, Latreille, Encycl. Méthod. X. p. 685 (1825): De Haan, Faun. Japon. Crust. p. 27: Milne Edwards, Hist. Nat. Crust. II. 22, and Ann. Sci. Nat. Zool. (3) XX. 1853, p. 203: Smith, Trans. Connect. Acad. Sci. II. 1870, p. 142: Miers, Challenger Brachyura, p. 219: Ortmann, Zool. Jahrb., Syst., VII. 1893–94, p. 732.

? *Discoplax*, A. Milne Edwards, Ann. Soc. Entom. France, (4) VII. 1867, p. 248, and Nouv. Archiv. du Mus. IX. 1873, p. 293.

Carapace deep, convex fore and aft, transversely oval, with the lateral borders tumid and strongly arched owing to the vault-like expansion of the gill-chambers, the pterygostomian regions densely tomentose.

The fronto-orbital border is much more than half, and the deflexed and nearly straight front is about a fourth, the greatest breadth of the carapace. Orbits deep, with the outer angle defined by a denticle, and with the tooth at the inner angle well developed but distant from the front: the eyes are very loose in the orbits.

The antennules fold obliquely beneath the front, by which they are a good deal concealed: the inter-antennular septum is very broad. The antennæ lie in the orbital hiatus, which their broad basal joint nearly fills: their flagellum is very short.

Epistome short, prominent and well defined: buccal cavern elongate squarish, the external maxillipeds do not close it but leave between them a rhomboidal gap in which the mandibles are exposed. In the external maxillipeds the merus is a longish joint and carries the palp, which is large and not at all concealed, at its antero-external angle: the exognath, which carries a flagellum, is exposed in much the greater part of its extent. The exognaths of the other maxillipeds are heavily fringed with coarse hair.

The chelipeds, which are much more massive than the legs, may either be equal or markedly unequal, differing little in the sexes: they alter considerably with age—one or both—the arm and fingers becoming elongated, and the whole hand increasing in size until it becomes longer than the carapace is broad and more than half as high as the carapace is long.

The legs are stout: some of their joints are fringed with bristles, and their long strong dactyli are square in section and have a series of spines along all four edges.

The abdomen in both sexes consists of 7 separate segments, and in the male its base covers the whole width of the sternum between the last pair of legs.

The branchiæ are eight in number on either side: the gill chambers are vaulted and remarkably capacious, and they are lined by a thick vascular membrane folded to form a sort of pocket, and as in several other crabs—such as *Gelasimus* and *Ocypoda*—that spend most of their time out of water, a sort of "choroid process" of this membrane, shaped like a gill-plume, projects laterally over the pleura of the penultimate pair of legs.

The species of this genus live on land. They are very common in the jungles of the Andamans where they may be found in the day time crouching under roots, fallen logs, &c., sometimes in burrows near the shore.

Distribution: West Indies and neighbouring coasts of America, Cape Verde Is. and West Coast of Africa, Indo-Pacific from Madagascar to Chili.

Key to the Indian species of Cardiosoma.

I. Carapace very strongly convex fore and aft, the regions indistinct: breadth of the orbit not much more than half its length: merus of the legs with bristles only at its distal end............ *C. carnifex.*

II. Carapace very moderately convex fore and aft, the regions distinct: breadth of the orbit about two-thirds its length: merus of the legs with bristles along its whole length............ *C. hirtipes.*

128. *Cardiosoma carnifex*, (Hbst.).

Cancer carnifex and *hydromus*, Herbst, Krabben etc. II. v. 163, 164, pl. xli. figs. 1, 2 (1794).

Cardisoma carnifex, Latreille, Encycl. Méthod. X. p. 685: Milne Edwards, Hist. Nat. Crust. II. 23: Guérin, Icon. Règne An., Crust. pl. v. fig. 2: Dana, U. S. Expl. Exp. Crust. pt. I. p. 377: Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 204: Heller, Novara Crust. p. 35: A. Milne Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 71, and IX. 1873, p. 264: Hoffmann, in Pollen and van Dam, Faun. Madagasc., Crust. p. 12: Brocchi, Ann. Sci. Nat., Zool., (6) II. 1875, Art. 2, p. 85, pl. xvii. figs. 117, 118 (*male appendages*): Miers, P. Z. S. 1877, p. 137, and Phil. Trans. 1879, p. 490, and Challenger Brachyura, p. 220: Hilgendorf, MB. Ak. Berl. 1878, p. 801: de Man, Notes Leyden Mus. II. 1880, p. 31, and in Weber's Zool. Ergebn. Niederl. Ost.-Ind. II. p. 285: Richters, in Möbius, Meeresf. Maurit. p. 157: Lenz and Richters, Abh. Senck. Nat. Ges. XII. 1881, p. 422: Taschenberg, Zeitschr. f.

Naturwiss. LVI. 1883, p. 171: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 380: Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 271.

Cardisoma Guanhumi var. *carnifex*, Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 735.

Cardisoma obesum, Dana, Proc. Ac. Nat. Sci. Philad. V. 1851, p. 252, and U. S. Expl. Exp. Crust. pt. I. p. 375, pl. xxiv. fig. 1: Milne Edwards, Ann. Sci. Nat., *t.c.* p. 205: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 100: Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 114: ? de Man, Notes Leyden Mus. II. 1880, p. 35.

Cardisoma Urvillei, Milne Edwards, Ann. Sci. Nat. *t.c.* p. 204: de Man, Notes Leyden Mus. *t.c.*, p. 33.

Carapace strongly convex fore and aft, especially in the young, the regions are indicated by inequalities of level, but the posterior limit of the gastric region and the cardiaco-intestinal region are defined by grooves: the posterior areola of the gastric region is always tumid.

The antero-lateral border of the carapace is defined by a fine raised line, becoming indistinct with age, which is not continuous with the small tooth at the outer orbital angle, but starts at a little denticle of its own.

The sides of the front (inner boundaries of the orbit) are very oblique: the sinuous upper border of the orbit runs very slightly backward to the base of the outer orbital tooth: the greatest width (height) of the orbit is little more than half the length of that cavity. The basal antenna-joint is large, touching the front.

The breadth of the buccal cavern, measured across the middle of the external maxillipeds, is equal to its length in the middle line.

In both sexes the chelipeds are unequal: they are smooth, except for a few small tubercles or wrinkles or denticles or granules along the edges of some of the joints: the inner angle of the wrist is dentiform, the palm is higher than long, especially in the larger hand, the stout fingers meet only at tip, especially in the larger hand.

The size of the larger cheliped varies with age. In adults of moderate size it is about twice the length of the carapace, the ischium hardly projects beyond the carapace, and the length of the dactylus is about equal to the height of the palm. In old specimens, especially in the male sex, it is about $2\frac{3}{4}$ times the length of the carapace, the ischium projects far beyond the carapace, and the length of the dactylus is $1\frac{1}{2}$ times the height of the palm.

In the legs there are stiff bristles, not very thickly set, at the distal end of the merus, on the anterior border and surface of the carpus and on both borders of the propodite.

The 7th segment of the male abdomen is half or less than half the length of the 6th, measured in the middle line.

In the Indian Museum there are 13 specimens from the Andamans and the Coromandel coast (besides specimens from Tahiti and Madagascar).

Ortmann considers that this form is only a variety of the West Indian *C. Guanhumi*, with which he regards the West African *C. armatum* as synonymous. So far as I can judge from single specimens of these two supposed species, I should think that this view is correct.

129. *Cardiosoma hirtipes*, Dana.

Cardisoma hirtipes, Dana, Proc. Ac. Nat. Sci. Philad. 1851, p. 253, and U. S. Expl. Exp. Crust. pt. I. p. 376, pl. xxiv. figs. 2, *a-d* : Milne Edwards, Ann. Sci. Nat., Zool., (3) XX. 1853, p. 205 : Hess, Archiv f. Naturges. XXXI. 1865, i. p. 140 : Heller, Novara Crust. p. 35 : Miers, Cat. Crust. New Zealand, p. 53 : de Man, Notes Leyden Mus. II. 1880, p. 34, and Archiv f. Naturges. LIII. 1887, i. p. 349, pl. xiv. fig. 3 : E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 26 (*gastric teeth*) : Filhol, Crust. N. Z. in Miss. l'ile Campbell, p. 460 : Ortmann, Zool. Jahrb., Syst., VII. 1893-94, p. 737 : Whitelegge, Mem. Austral. Mus. III. 1897, p. 138 : Nobili, Ann. Mus. Genov. (2) XX. 1899, p. 271.

Discoplax longipes, A. Milne Edwards, Ann. Soc. Entomol. France, (4) VII. 1867, p. 284, and Nouv. Archiv. du Mus. IX. 1873, p. 294, pl. xv. (*see* Ortmann, *l.c.*).

This species is easily distinguished from *C. carnifex* by the following characters :—

(1) the carapace is much less convex, the regions are much more distinctly defined, and the gastric region is distinctly subdivided, by grooves, into 3 areolæ : moreover there are some fine oblique striæ on the sides of the epibranchial regions :

(2) the sides of the front, or inner boundaries of the orbit, are not nearly so oblique : the upper border of the orbit is less sinuous and runs slightly forwards to the outer orbital angle : the greatest width of the orbit is nearly two-thirds the length of that cavity. The basal antenna joint does not touch the front :

(3) the breadth of the buccal cavern, measured across the middle of the meri of the external maxillipeds, falls considerably short of the length measured in the middle line :

(4) the chelipeds may be unequal but are far more commonly equal, even in old specimens in which the palms and fingers have grown long and the palm become enlarged :

(5) the bristles on the legs are more thickly set, and they occur along the whole of the anterior border of the merus :

(6) the 7th segment of the male abdomen is more than half the length of the 6th, measured in the middle line.

In the Indian Museum are 18 specimens from the Nicobars and Andamans (besides 4 from the "South Seas" and Madagascar).

In life the carapace is dark violet and the chelæ bright cinnabar red.

PELOCARCINUS, Edw.

Gecarcoidea, Milne Edwards, Hist. Nat. Crust. II. 25 (1837).

Pelocarcinus, Milne Edwards, Ann. Sci. Nat. Zool. (3) XX. 1853, p. 203, and Archiv. du Mus. VII. 1854–55, p. 183: A. Milne Edwards, Nouv. Archiv. du Mus. (3) II. 1890, p. 171 (*et synon.*).

Hylæocarcinus, Wood-Mason, J.A.S.B. XLII. 1873, pt. 2, p. 258, and Ann. Mag. Nat. Hist. (4) XIV. 1874, p. 189.

Limnocarcinus, de Man, Notes Leyden Mus. I. 1879, p. 65.

Gecarcoidea, Ortmann, Zool. Jahrb., Syst., VII. 1893–94, pp. 732, 738.

Carapace transversely oval, somewhat depressed, with the lateral borders tumid and strongly arched owing to the vault-like expansion of the gill-chambers: the gastric region particularly well defined.

The extent of the fronto-orbital border is less than half the greatest breadth of the carapace, that of the strongly deflexed and nearly straight front is from a sixth to a seventh the greatest breadth of the carapace.

Orbits deep, broadly oval, demarcated dorsally by a sharpish slightly raised border, their outer angle not defined, a wide gap in their lower border: at the inner angle there is a strong tooth which may or may not, even in the same species from the same jungle, meet the front: if it does so, the antennæ, which are much reduced in size, are excluded from the orbit.

The antennules fold obliquely beneath the front, and the interantennular septum is not very broad.

Epistome sunken, hairy posteriorly so as to appear ill defined from the palate. Buccal cavern rounded anteriorly, not nearly closed by the external maxillipeds, which leave between them a wide rhomboidal gap in which the mandibles are exposed.

The external maxillipeds are rather short: their merus lies obliquely, and its anterior edge is excavated for the insertion of the palp, which is short and coarse and is completely exposed: their exognath is very short and almost entirely concealed and is without a flagellum. The exognaths of the other maxillipeds are heavily fringed with hair.

Chelipeds much more massive than the legs, usually equal in both sexes, though larger and longer in the male than in the female.

Legs stout: in all, the anterior border of the carpus and all the borders of the propodite and dactylus are spiny, there being six rows of spines on the dactylus.

The abdomen in both sexes consists of 7 separate segments, and in the male its base covers all the breadth of the sternum between the last pair of legs.

The gill-chamber and its lining membrane, and the number of branchiæ, are as in *Cardiosoma.*

The *Pelocarcini* are land-crabs. The single Indian species is very common in the jungles of the Andamans, where, especially on the smaller islets, it grows to a large size.

Distribution: Brazil, Andamans and Nicobars, Celebes, Philippines, New Guinea, Loyalty Is.

Ortmann (*l.c.*) throws doubt on the locality Brazil, but, as it appears to me, without sufficient reason, seeing that the elder Milne Edwards states definitely that the type of the species was found in that country by a collector of the Paris Museum. *Pelocarcinus* is by no means the only form of animal life that has this very curious and suggestive distribution, which we also find, among Mammals in the Tapirs, among Birds, as Mr. Finn informs me, in the Piculets of the genus *Picumnus*, among Reptiles in the *Ilysiidæ*, and among fishes in the freshwater eels of the genus *Symbranchus.*

130. *Pelocarcinus Humei* (Wood-Mason).

Hylæocarcinus Humei, Wood-Mason, Journ. As. Soc. Bengal, Vol. XLII. 1873, pt. 2, p. 260, pls. xv, xvi, and Ann. Mag. Nat. Hist. (4) XIV. 1874, p. 190.

Carapace transversely oval, becoming broader with age, its lateral borders tumid and ill defined. The gastic region is particularly well delimited and is divided into three subregions—two antero-lateral and one postero-median—the anterior two of which are separated from one another by a deep groove: the cardiac-intestinal region is fairly well defined.

In adults the carapace is smooth, except for some oblique striæ on the lateral borders, which become squamiform markings on the pterygostomian regions, these regions being devoid of tomentum.

Front nearly vertically deflexed, somewhat spatulate but with the free edge straight. The tooth at the inner angle of the orbit does not usually touch the front, but sometimes it does and excludes the small antennæ from the orbit.

The chelipeds in the adult male are usually equal and are about 2½ times the length of the carapace: the arm projects a long way beyond the carapace, and its upper and inner borders are rugose or irregularly tuberculate; the inner angle of the wrist is truncated; the palm is enlarged, its length is about 1½ times its height and about as long as the dactylus; the fingers, though they only meet at tip, are not widely separated.

In the adult female the chelipeds are about $1\frac{1}{2}$ times the length of the carapace: the arm projects but little, the hand is not much enlarged, and the fingers almost meet throughout their length.

In many young females the inner edge of the wrist is serrated and there are also a few denticles along the upper border of the palm.

The second pair of legs, which are the longest, are hardly twice the length of the carapace.

Colours in life: carapace violet with some dirty yellow markings: chelipeds and legs yellowish with a livid reddish tinge.

In the Indian Museum are specimens from the Nicobars and from numerous islands of the Andaman group. The largest one has a carapace 82 millim. long and 110 broad.

Family PALICIDÆ, Rathbun.

Palicus, Philippi.

Cymopolia, Roux, Crust. Médit. pl. xxi. 1828: Milne Edwards, Hist. Nat. Crust. II. 158: Miers, Challenger Brachyura, p. 333 (*nom præocc.*).

Palicus, Mary J. Rathbun, Proc. Biol. Soc., Washington, XI, 1897, pp. 93, 165 ["Philippi, Zweiter Jahresber. d. Vereins f. Naturk. in Cassel, 11, 1838."].

Carapace depressed, broader than long, covered with granules and with symmetrical tubercles or rugosities that have a tendency to fall into transverse series.

Front about a third the greatest breadth of the carapace, little or not at all deflexed, usually lobed or toothed. Lateral borders of the carapace hardly curved, serrated anteriorly.

Orbits deep, the upper border is cut into several teeth by deep clefts, and there are usually two clefts in the lower border.

The antennules fold nearly transversely beneath the front: the interantennular septum is a narrow plate. The antennæ commonly have the basal joint, which stands in the orbital hiatus, enlarged: the flagellum is well developed.

Epistome sunken, not defined. Buccal cavern square. The external maxillipeds do not close the buccal cavern anteriorly: their merus is very small and is much narrower than the ischium: the ischium has its antero-internal angle and the merus its antero-external angle much produced: the palp articulates near the middle of the concave summit of the obliquely-placed merus.

Chelipeds short and usually slender in the female: in the adult male one of them may be enlarged—rarely both.

The two middle pairs of legs are much the largest: the first pair, except that they are much shorter and slenderer, resemble the middle pairs, but the fourth pair are weak, sometimes filiform, and are elevated above the third pair as in *Dorippe*, etc.

The abdomen in both sexes consists of 7 separate segments, the basal segments being very narrow fore and aft and the 1st linear.

In the female the genital openings are on the 2nd segment of the sternum close to the suture between it and the first.

Distribution: Atlantic coasts of Central America and of the United States, Cape Verde and Mediterranean, Indo-Pacific from Seychelles to California.

The Indian species of *Palicus* live among coral shingle at a depth of from 10 to 40 fathoms, where their mottled coloration and granular rugose carapace afford a good concealment.

Key to the Indian species of Palicus.

- I. Posterior border of the propodites and dactyli of the first 3 pairs of legs entire:—
  - 1. Front cut into two lobes:—
    - i. Lobes of front broad: propodites and dactyli of the two middle pairs of legs sub-foliaceous .... *P. Jukesii.*
    - ii. Lobes of front subacute: propodites and dactyli of the two middle pairs of legs compressed but not broadened .... *P. Whitei.*
  - 2. Front cut into four lobes, the middle two subacute, the outer ones broad........................ *P. Wood-Masoni.*
- II. Posterior border of the propodites and dactyli of the first 3 pairs of legs elegantly serrate:—
  - 1. Front cut into four blunt teeth: propodites and dactyli of the two middle pairs of legs broadly foliaceous .... *P. serripes.*
  - 2. Front cut into four acute teeth: propodites and dactyli of the two middle pairs of legs compressed but not foliaceous .... *P. investigatoris.*

131. *Palicus Jukesii* (White).

Cymopolia Jukesii, White, in Jukes' Voy. H. M. S. "Fly," p. 338, pl. ii. fig. 1: Miers Zool. H. M. S. "Erebus" and "Terror," Crust. p. 3, pl. iii. figs. 4-4c, and Challenger Brachyura, p. 335: Haswell, Cat. Austral. Crust. p. 138: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 405.

Carapace with the regions well defined, and with the surface thrown into four transverse wrinkles, the two middle ones of which are the most convex and best defined: the whole surface is also closely covered with vesiculous and crystalline granules, which are largest on the convexities.

Front divided into two broad rounded lobes: antero-lateral border of the carapace cut into three teeth including the orbital angle: posterior border of the carapace raised, but not cut into well-spaced lobules.

Upper border of the orbit with two deep notches between the inner and outer orbital angles, both of these angles having a concave margin: lower border with two deep notches. There is a leaf-like lobule on the granular eye-stalk, another at the outer angle of the basal antenna-joint, and another in the gap between the antenna and the outer angle of the buccal cavern. The exposed surface of the ischium of the external maxillipeds is obliquely traversed by two ridges which meet at the produced antero-internal angle of the joint.

The chelipeds of the *adult* male are granular and downy and are usually markedly unequal. The larger one is stout, is more than $1\frac{1}{2}$ times the length of the carapace and has a swollen (subcylindrical) club-shaped palm of which the length is not twice the greatest height: the fingers are short and stumpy, the dactylus being little more than a third the length of the palm, and meet only at tip: the smaller cheliped of the male is short and slender, sometimes however it is almost as large as its fellow.

In the female the chelipeds are equal, are hardly longer than the carapace and hardly stouter than the last pair of legs: they have a palm which is as slender and nearly as long as the ischium, and incurved fingers which nearly meet throughout their length.

In the first 3 pairs of legs the merus is stout and broad with a granular dorsal surface and coarsely and unevenly serrulate edges, the anterior edge ending in a crest-like tooth; the carpus is dorsally carinate, and its anterior border has the form of a two-lobed carina; and the propodite and dactylus are subfoliaceous owing to the depth of the thin sharp carinæ of their edges—these carinæ being plumed. The 4th pair of legs are short weak and granular as far as the dactylus, which is much shorter than the propodite.

The 1st pair of legs are a little longer, the 4th pair a little shorter, than the carapace: the 2nd and 3rd pairs are about $1\frac{2}{3}$ times the length of the carapace.

In both sexes all the abdominal terga, except the last, are transversely carinate, the carinæ of the 2nd and 3rd terga being most conspicuous. Also on either side of the sternum there are two crests, one behind the base of the last pair of legs, the other almost in a line with the 3rd abdominal carina.

In the Indian Museum are 32 specimens, from the Andamans (up to 36 fath.), the Maldives (15–30 fath.), and Ceylon (34 fath.). The carapace of the largest female is 13 millim. long and 15 broad.

132. *Palicus Whitei* (Miers).

Cymopolia Whitei, Miers, Zool. H. M. S. "Alert," pp. 518, 551, pl. xlix, fig. C.

At once distinguished from *P. Jukesii*, which it closely resembles, by the sharper and more prominent lobes of the front, and by the slenderer form of the first 3 pairs of legs, in which the edges of the meri are not serrated, the anterior borders of the carpi are not cristiform, and the propodites and dactyli are not in any way subfoliaceous, their edges not being produced to form high thin carinæ.

Other differences, to be noted on closer inspection, are the following:—

The transverse arrangement of the rugæ of the carapace is not marked: the faint transverse carinæ of the 5th and 6th abdominal terga are absent.

In the Indian Museum are 2 adult females and a non-adult female, from the Andamans.

133. *Palicus Wood-Masoni*, n. sp.

Carapace with the regions distinct and areolated in high relief: except posteriorly, the areolæ have no tendency to arrange themselves transversely: the convexities of the areolæ, but not the interspaces, bear clumps of crystalline granules.

Front cut into 4 teeth, the middle pair narrower, slightly more prominent, and on a rather lower plane than the others: lateral border of the carapace cut into three teeth, including the very large and acute orbital angle: posterior border raised and irregularly lobulate.

In the upper border of the orbit there are three deep notches, in the lower border a notch and a fissure.

There is only one cheliped in the single specimen known: it is short, not stouter than the legs, and has some blunt denticles on the far end of the arm, on the wrist, and on the upper surface of the hand.

In the first 3 pairs of legs the meri are stout and have a granular dorsal surface and coarsely serrulate edges, the anterior edge ending in a coarse spine; the carpi are dorsally carinate, and their anterior edge has the form of a two-lobed crest; while the propodites and dactyli are elongate and compressed with thin, but not cristiform, plumed edges. The filamentous 4th pair are granular up to the dactylus, which is not much shorter than the propodite.

The 1st pair of legs are about 1½ times, the 2nd and 3rd pairs are about 2¼ times, the length of the carapace, while the 4th pair are about as long as the carapace.

In the male (female unknown) the first 5 abdominal terga are transversely carinated, but the 4th and 5th carinæ are faint. The sternum is also carinated on either side of the abdomen, as in *P. Jukesii*, but the crests are much lower.

In the Indian Museum is a single male specimen from the Andamans: its carapace is 9 millim. long and 11 broad.

134. *Palicus serripes*, Alcock & Anderson.

Cymopolia serripes, Alcock & Anderson, Journ. As. Soc. Bengal, Vol. LXIII. pt. 2, 1894, p. 208: Illustrations of the Zoology of the Investigator, Crust. pl. xxiv. fig. 7.

Carapace with the regions well defined and cut up into a multitude of symmetrical convex areolæ, its whole surface is covered with crystalline granules which are enlarged on the convexities of some of the areolæ.

Front cut into 4 teeth, the middle two of which, though deflexed and on a lower plane, are much sharper and more prominent than the others: lateral borders of the carapace posteriorly divergent, cut into five ragged teeth, inclusive of the orbital angle: posterior border cut into from eight to ten well spaced even tooth-like lobes.

Upper border of orbit with 3 deep notches, lower border with a notch and a fissure: eyestalks sharply granular. Ischium of the external maxillipeds longitudinally grooved.

The chelipeds of the female (male unknown) though shorter than the carapace are stouter than the first pair of legs: they may be subequal or unequal: the arm, wrist, and the upper surface of the palm are sharply granular, the palm is rather full and is not elongate, being about half again as long as high and less than half again as long as the fingers.

The 1st pair of legs are about as long as the carapace: their merus is sharply granular and its anterior border ends in a spine: their propodite and dactylus are thin and compressed but not broadened, and their posterior border is evenly serrated.

The 2nd and 3rd pair of legs are a little over 1½ times the length of the carapace: their merus is very stout and broad, with a granular dorsal surface and sharply though irregularly serrated edges: their carpus has the anterior border cristiform and irregularly serrate, and the posterior border subcristiform up to a terminal spine: their propodite and dactylus are short and broadly foliaceous, with the posterior border elegantly and evenly serrated and the anterior border fringed with long hair.

The 4th pair are filiform, not nearly as long as the carapace, and are granular up to the dactylus which is slightly longer than the propodite.

In the female the first 3 abdominal terga are transversely carinate: the carina of the first tergum, which alone is prominent, ends off in a sort of scroll, which flanks the postero-lateral angles of the carapace.

In the Indian Museum are 9 specimens, all adult females, from off the Madras coast in the neighbourhood of Palk Strait and from off Ceylon 34 fathoms. The carapace of the largest is 9·5 millim. long and 11 broad.

135. *Palicus investigatoris*, n. sp.

This species is closely related to *P. serripes*, but differs in the following characters:—

The areolæ of the carapace are capped, not by clusters of granules, but by sharp little tubercles between which the surface is smooth: except on the lateral regions of the carapace there is only one such tubercle to each areola:

(1) the four teeth of the front are all equally acute: the five teeth of the lateral borders of the carapace, though irregular in size, are all very sharp and clean cut: the teeth of the posterior border are smaller and sharper:

(2) there is no fissure towards the inner end of the lower border of the orbit:

(3) there are denticles or sharp tubercles, instead of granules, on the arm, wrist, and upper surface of the hand:

(4) the legs only differ in the case of the 2nd and 3rd pairs in which none of the joints are so broad: the serration of the edges of the merus is different, the terminal spine of the anterior border being greatly enlarged; the anterior border of the carpus has a spine at each end, but is not otherwise serrated; and the dactylus and propodite, though thin and compressed, and otherwise quite like those of *P. serripes*, are not broadened, being much less foliaceous.

In the Indian Museum is a single non-adult male from off the Andamans: its carapace is nearly 7 millim. long and 8 millim. broad.

Family PTENOPLACIDÆ.

PTENOPLAX, Alcock & Anderson.

Archæoplax, Alcock and Anderson, Journ. As. Soc. Bengal, Vol. LXIII. pt. 2, 1894, p. 180.

Ptenoplax, Alcock and Anderson, Illustrations of the Zoology of the Investigator, Crust. pl. xv. 1895: Alcock, Investigator Brachyura, p. 78.

As the generic diagnosis has already been published in this Journal (*loc. cit.* Archæoplax) the above references are sufficient.

136. *Ptenoplax notopus*, Alcock & Anderson.

Archæoplax notopus, Alcock and Anderson, Journ. As. Soc. Bengal, LXIII. pt. 2, 1894, p. 181, pl. ix. fig. 3.

Ptenoplax notopus, Alcock and Anderson, Ill. Zool. Investigator, Crust., pl. xv. fig. 2: Alcock, Investigator Brachyura, p. 79.